AD-683 600

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A DDC BIBLIOGRAPHY ON
COMPUTER - AIDED LOGICAL PROCESSES

(Information Sciences Series)

VOLUME I OF II VOLUMES

DDC-TAS-68-77

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A DDC BIBLIOGRAPHY ON

COMPUTER – AIDED LOGICAL PROCESSES
(INFORMATION SCIENCES SERIES)

Volume I of II Volumes

DDC-TAS-68-77

DECEMBER 1968

DEFENSE DOCUMENTATION CENTER
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PREFACE

This Unclassified and Unlimited bibliography compiles references cataloged by DDC since 1953 and deals with Computer-Aided Logical Processes. The references include all research on the processes of information handling and also the application of fundamental mathematical theory to the construction or better understanding of information systems.

The 186 citations are grouped under six major headings which correspond directly to those of the Panel on Information Science Technology, Committee on Scientific and Technical Information, Federal Council for Science and Technology. These headings are: Computer Logic; Biological Information Handling; Human Factor Information Handling; Programmed Instruction; Network and Switching Systems Theory; and Information, Communication, and Systems Theory.
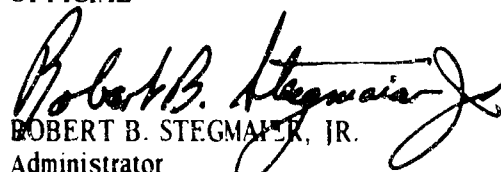
Entries are arranged in accession number (AD-number) sequence within each major heading. Four indexes, Corporate Author-Monitoring Agency, Personal Author, Contract and AD-Numeric, are appended to facilitate access to the references.

An Unclassified and Limited version of this bibliography has been compiled and will be announced in the *Technical Abstract Bulletin* (TAB).

BY ORDER OF THE DIRECTOR, DEFENSE SUPPLY AGENCY

OFFICIAL

ROBERT B. STEGMAIER, JR.
Administrator
Defense Documentation Center

T A B L E   O F   C O N T E N T S

COMPUTER LOGIC

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-282 818
  BURROUGHS CORP PHILADELPHIA PA
  MAGNETIC PARAMETRON LOGIC ELEMENTS   (U)
DESCRIPTIVE NOTE: QUARTERLY PROGRESS REPT. NO. 1, 1 APR-
    30 JUN 62,
       JUN   62   IV   EINHORN,S.N.;POWELL,W.S.;
CONTRACT: DA36 039SC89204
PROJ: 3A99-15-001-03

        UNCLASSIFIED REPORT

DESCRIPTORS: •COMPUTER LOGIC, •DIGITAL COMPUTERS,
 •MICROMETERS, MAGNETIC TAPE, PRINTED CIRCUITS, THIN
 FILMS (STORAGE DEVICES)   (U)
IDENTIFIERS: THIN FILMS, THIN FILMS ELECTRONICS,
 PARAMETRONS   (U)

 RESEARCH IS BEING DIRECTED TOWARD THE DEVELOPMENT
 OF ADVANCED PARAMETRON ELEMENTS, CONFIGURATIONS,
 CIRCUIT ARRANGEMENTS, AND MODES OF OPERATION SUITED
 TO PERFORM LOGIC FUNCTIONS IN DATA PROCESSING SUB-
 SYSTEMS. EMPHASIS IS PLACED ON THE REALIZATION OF
 RELIABLE MAGNETIC-FILM PARAMETRONS WHICH LEND
 THEMSELVES TO LARGE SCALE PRODUCTIONAT LOW COST.
 A PART OF THE PARAMETRON DESIGN EFFORT WAS A STUDY
 OF DEMAGNETIZING FIELDS, WHICH POINTS TO THE
 FEASIBILITY OF SMALL COILS WITH 3 BY 3 MM FILM
 ELEMENTS. INDUCTANCE MEASUREMENTS AND OPERATIONAL
 TESTS OF PARAMETRON COILS HAVE, SO FAR, LED TO AN
 OPTIMUM DESIGN HAVING 34 TURNS OF NO. 44 WIRE.
 HOWEVER, AN EFFORT IS UNDERWAY TO REDUCE THE
 NUMBER OF TURNS, SINCE THE CAPACITANCE REQUIRED FOR
 RESONANCE AT THE 25-MC SIGNAL FREQUENCY IS SMALL
 COMPARED TO THE ESTIMATED WIRING CAPACITANCE. A
 MODEL INCORPORATING PROPOSED PACKAGING TECHNIQUES WAS
 CONSTRUCTED. THE TECHNIQUES INCLUDE A
 PRINTEDCIRCUIT BOARD FOR LOGIC INTERCONNECTIONS, A
 GROUND PLANE WHICH BOTH COMPLETES THE LOGIC SIGNAL
 PATHS AND SHIELDS THE SIGNAL CIRCUITS FROM THE PUMP
 FIELDS, AND A MINIATURE PRINTEDCIRCUIT PARAMETRON
 COMPONENT BOARD. (AUTHOR)   (U)

AD-283 487
  ELECTRONIC SYSTEMS DIV L G HANSCOM FIELD MASS
  A COMPARISON OF TWO LOGIC SYMBOL CODING TECHNIQUES IN
  A SIMULATED DIGITAL DEVICE MAINTENANCE
  ENVIRONMENT   (U)
     JUL   62   IV   BAKER,JAMES D.;WHITEHURST,ALBERT J.;
REPT. NO. TDR62 196
MONITOR: ESD   TDR62 196

        UNCLASSIFIED REPORT

DESCRIPTORS: *DATA PROCESSING SYSTEMS, *DIGITAL
COMPUTERS, *LANGUAGE, ANALYSIS OF VARIANCE, CIRCUITS,
CODING, COMPUTER LOGIC, CONFIGURATION, DIGITAL
SYSTEMS, HUMAN ENGINEERING, MAINTENANCE, MATHEMATICAL
LOGIC, TRAINING DEVICES, WIRING DIAGRAMS   (U)

  THIS STUDY WAS DESIGNED TO EVALUATE WHICH OF TWO
  TECHNIQUES IS BETTER FOR ENCODING THE LOGIC SYMBOLS
  IN DETAILED LOGIC DIAGRAMS TO CONVEY INFORMATION
  ABOUT DIGITAL CIRCUITS. ONE TECHNIQUE EMPLOYED
  SHAPE ENCODING TO DIFFERENTIATE BASIC LOGIC
  FUNCTIONS; THE OTHER USED ALPHABETIC IDENTIFIERS.
  THE FINDINGS SHOWED THAT USING SHAPE ENCODED
  SYMBOLS IN SIMULATED DETAILED LOGIC DIAGRAMS
  RESULTED IN A SIGNIFICANT REDUCTION IN THE TIME
  REQUIRED TO SOLVE MAINTENANCE TYPE PROBLEMS. IT
  IS CONCLUDED THAT SHAPE ENCODING IS THE BETTER OF THE
  TWO TECHNIQUES, FOR USE IN OPERATIONAL SITUATIONS,
  IF TIME-SAVING IS OF CONCERN. BASED UPON
  OBSERVATIONS MADE DURING THE DESIGN AND CONDUCT OF
  THIS STUDY, TWO SETS OF RECOMMENDATIONS ARE MADE.
  (AUTHOR)   (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-286 295
  LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
  THREADED LIST STRUCTURES IN THE DESIGN AUTOMATION OF
  STROKE LOGIC   (U)
      JUL   62   IV   UBER,G.T.;
REPT. NO.   6 90 62 55

        UNCLASSIFIED REPORT

DESCRIPTORS: *ALGEBRAS, *AUTOMATION, *COMPUTER LOGIC,
 *DIGITAL COMPUTERS, TOPOLOGY   (U)

A SYSTEM IS DESCRIBED WHICH WAS DEVELOPED AS PART
OF A PROGRAM TO INVESTIGATE TECHNIQUES FOR MINIMIZING
AND IMPLEMENTING DIGITAL LOGIC. THE APPROACH WAS
THAT OF MANIPULATING A DATA STRUCTURE WHICH CLOSELY
REPRESENTS THE FINAL HARDWARE REALIZATION. THE
COMMON USE OF SHEFFER-STROKE CIRCUITRY, PLUS THE
SIMPLICITY OF A MODEL USING A SINGLE LOGICAL
CONNECTIVE, HAS MADE IT POSSIBLE TO DEVELOP A SYSTEM
BASED UPON STROKE LOGIC. THE INITIAL INVESTIGATION
WAS CONCERNED WITH MINIMIZING TREES OF SINGLE-OUTPUT
DEVICES. THESE CAN BE COMPACTLY REPRESENTED INSIDE
A COMPUTER BY MEANS OF THREADED LIST STRUCTURES WHICH
WERE DEVELOPED BY PERLIS AND THORNTON. THE
SECTIONS DISCUSS THE TRANSLATION OF BOOLEAN EQUATIONS
INTO THREADED LIST STRUCTURES AND THE MANIPULATION OF
THESE STRUCTURES. (AUTHOR)   (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-428 087
  ADAPTRONICS INC MCLEAN VA
  THEORY OF PROBABILITY STATE VARIABLE SYSTEMS. VOLUME
  III. MONOTYPE SYSTEM THEORY AND CONSIDERATIONS FROM
  AUTOMATA THEORY,   (U)
DESCRIPTIVE NOTE: FINAL REPT., 15 OCT 61-14 OCT 63,
     DEC 63   141P   GILSTRAP,L. O. ,JR.;
  PEDELTY,M. J. ;LEE,R. J. ;
CONTRACT: AF33 657 7100
PROJ: 1 7 4160
TASK: 416004
MONITOR: ASD   TDR63 664, VOL. 3

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TEACHING MACHINES, MATHEMATICAL
 ANALYSIS), (*COMPUTER LOGIC), COMPUTERS, CYBERNETICS,
 MEMORY, PATTERN RECOGNITION, PROBABILITY, NETWORKS,
 COMMUNICATION THEORY, SWITCHING CIRCUITS, MATHEMATICAL
 LOGIC   (U)
IDENTIFIERS: 1962, NEUROTRON, AUTOMATON, GENOTYPE
 NETWORKS, AUTOMATA THEORY, MONOTYPE NETWORKS, OPEN-
 LOOP NETWORKS, PERCEPTRONS   (U)

  THE SUBJECT OF PROBABILITY STATE VARIABLE SYSTEMS
  IS EXAMINED FROM TWO POINTS OF VIEW. THE FIRST
  POINT OF VIEW IS THAT OF AUTOMATA THEORY AND THE
  PROBLEMS OF AUTOMATON ENVIRONMENT INTERACTION IS
  DISCUSSED. SECONDLY, A DETAILED STRUCTURAL MODEL
  OF A GENERALIZED SWITCHING DEVICE IS FORMULATED AND
  THE MAJOR PROBLEMS OF INTEREST IN THE THEORY OF
  MONOTYPE PROBABILITY STATE VARIABLE SYSTEMS ARE
  DESCRIBED. NOVEL MATHEMATICAL METHODS FOR
  DETERMINING PROPERTIES OF THE PROBABILITY STATE
  VARIABLE DEVICE ARE DEVELOPED. AN INDEX NOTATION
  FOR LOGIC PROBLEMS IS PRESENTED AND SOME OF THE
  GENERAL PROPERTIES OF SWITCHING NETWORKS ARE ANALYZED
  USING THIS NOTATION. (AUTHOR)   (U)

AD-429 098
  WESTERN RESERVE UNIV CLEVELAND OHIO
  MATHEMATICAL FORMULATION OF BASIC PROCEDURES IN
  DOCUMENTATION,   (U)
      APR 60   50P   PERRY,JAMES W. I
  GOFFMAN,WILLIAM I
CONTRACT: AF49 638 357
MONITOR: AFOSR   TN00 366

      UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON THEORY OF DOCUMENTATION
AND STRATEGY OF SEARCHING.

DESCRIPTORS: .*DOCUMENTATION, THEORY) (*COMPUTER
LOGIC, DOCUMENTATION), INFORMATION RETRIEVAL, SUBJECT
INDEXING, CODING, ABSTRACTS, MANNED, AUTOMATION,
PROGRAMMING (COMPUTERS), DECISION MAKING, MATHEMATICAL
LOGIC, COMPUTERS, DESIGN   (U)
IDENTIFIERS: FLOW CHARTS, 1960   (U)

  CERTAIN BASIC ASPECTS OF DOCUMENTATION, ESPECIALLY
  THE RELATIONSHIP OF A ''MESSAGE'' TO ALTERNATE MEANS
  FOR ITS EXPRESSION AND RECORDING WERE STUDIED.
  ATTENTION WAS ALSO DIRECTED TO VARIOUS
  DOCUMENTATION PROCESSES IN WHICH THE MESSAGE REMAINS
  INVARIANT, THOUGH THE SYMBOLISM FOR EXPRESSING IT MAY
  BE GREATLY ALTERED. IN CONSIDERING MATHEMATICAL
  FORMULATION, THIS LED TO SUCH CONCEPTS AS THE MESSAGE
  AS A SET, WHICH MAY FIND EXPRESSION IN AN EQUIVALENCE
  CLASS OF SETS, EACH OF WHICH IS A VERSION OF A GIVEN
  MESSAGE. THE CONCEPT OF SET, IN TURN, LED US TO
  SUCH CONCEPTS AS SETS OF SETS, SUB-SETS, AND
  IRREDUCIBLE SUB-SETSALSO SOMETIMES CALLED ''UNIT
  ELEMENTS.'' THE CONCEPTS OF MAPPING AND INVERSE
  MAPPING WERE ALSO SHOWN TO BE DIRECTLY INVOLVED WHEN
  DEALING WITH SUCH EQUIVALENCE CLASSES. THESE
  CONCEPTS ARE OF ESSENTIAL IMPORTANCE FOR CONSIDERING
  IN A UNIFORM AND RIGOROUS MANNER A VERY WIDE RANGE OF
  DOCUMENTATION PROCESSES RANGING FROM TRANSLATING FROM
  ONE NATURAL LANGUAGE TO ANOTHER TO ALPHABETICAL
  INDEXING, ENCODING FOR MACHINE SEARCHING, AND
  ABSTRACTING, PERFORMED EITHER BY PEOPLE OR BY
  PROGRAMMED MACHINES. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZAC463

AD-433 802
  STANFORD RESEARCH INST MENLO PARK CALIF
  CELLULAR LINEAR-INPUT LOGIC,   (U)
DESCRIPTIVE NOTE: FINAL REPT.,,
    FEB 64   268P   MINNICK,ROBERT C. ;
  SHORT,ROBERT A. !
CONTRACT: AF19 628 498
PROJ: 4641 ,SRI PROJ.4122
TASK: 464101
MONITOR: AFCRL   64 6

      UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER LOGIC, LINEAR SYSTEMS),
 (*DATA STORAGE SYSTEMS, NETWORKS), CIRCUITS, GEOMETRIC
 FORMS, BIBLIOGRAPHIES, MATHEMATICAL LOGIC, SWITCHING
 CIRCUITS, CASCADE STRUCTURES, DATA PROCESSING SYSTEMS,
 TOPOLOGY, COMPUTER LOGIC, SEQUENCES, TRIGGER CIRCUITS(U)
 IDENTIFIERS: 1964, CELLULAR ARRAYS, ARRAYS, TREES,
 RECTANGLES, TESSELLATIONS, ADDER ARRAY   (U)

  A NUMBER OF DIFFERENT CELLUALR ARRAYS ARE PROPOSED
  AND STUDIED IN THIS REPORT. THESE ARRAYS FALL INTO
  TWO STRUCTURAL CLASSES: NAMELY, TREES AND
  RECTANGLES. IT IS SHOWN IN THE REPORT THAT THEY
  CAN BE USED FOR A WIDE VARIETY OF DIGITAL TASKS.
  SOME OF THE MORE IMPORTANT POTENTIAL APPLICATIONS
  OF CELLULAR ARRAYS ARE CONSIDERED. A CONNECTION
  BETWEEN CELLULAR ARRAYS AND TESSELLATIONS IS ALSO
  POINTED OUT. CELLULAR ARRAYS FOR THE PRODUCTION OF
  COMBINATIONAL DIGITAL LOGIC ARE STUDIED. ARRAYS OF
  MAJORITY GATES ARE STUDIED BOTH IN TERMS OF TREES AND
  RECTANGLES. METHODS ARE DEVELOPED FOR SYNTHESIZING
  ARBITRARY COMBINATIONAL FUNCTIONS WITH A MINIMUM
  NUMBER OF GATES, WITHIN CERTAIN STRUCTURAL
  ASSUMPTIONS. AN ADDER ARRAY IS DESCRIBED AND
  STUDIED IN THIS SECTION. THESE ARRAYS PRODUCE
  SEVERAL ARBIIRARY COMBINATIONAL FUNCTIONS OF A SET OF
  INPUT VARIABLES. SEVERAL THEOREMS ARE PROVED
  RELATING TO THE TYPES OF POSSIBLE ADDER ARRAYS AND TO
  THE NUMBER OF CELLS IN THEM. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-436 349
   LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
   RESEARCH ON AUTOMATIC COMPUTER ELECTRONICS. VOL. II.
   LOGICAL DESIGN RESEARCH.   (U)
DESCRIPTIVE NOTE: FINAL REPT., 1 SEP 62-1 OCT 63,
      FEB 64   293P   TANAKA,RICHARD I. ;
CONTRACT: AF33 657 8777
PROJ: AF-7062
TASK: 7062093, 7062-04
MONITOR: RDT   TDR-63-4173-VOL-2

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTERS, DESIGN), COMPUTER LOGIC,
 ALGEBRAS, CIRCUITS, S-MATRIX, SWITCHING CIRCUITS,
 SPECIAL FUNCTIONS, TABLES, SET THEORY, DATA STORAGE
 SYSTEMS, SPECIAL PURPOSE COMPUTERS   (U)
IDENTIFIERS: 1964, BOOLEAU ALGEBRA, MINIMIZATION,
 TERNARY ALGEBRA, RACE PROGRAM, ALGORITHMS, RESIDUE
 NUMBERS, THRESHOLDS (MATH)   (U)

   THRESHOLD LOGIC AND TERNARY LOGIC DESIGN RESEARCH
   IS DESCRIBED IN THIS BOLUME. THE DESCRIPTION OF
   THRESHOLD LOGIC INCLUDES THEORETICAL RESULTS USABLE
   FOR SYNTHESIZING THRESHOLD FUNCTIONS BY MEANS OF
   ORTHOGONAL EXPANSIONS, BOOLEAN TECHNIQUES, OR
   DECOMPOSITION METHODS. DESIGN TECHNIQUES WHICH
   CONSIDER CONSTRAINTS IMPOSED BY PRACTICAL CIRCUIT
   CONSIDERATIONS ARE ALSO DESCRIBED, ALONG WITH THE
   ASSUMPTIONS WHICH DEFINE THE CONSTRAINTS. THE WORK
   ON TERNARY LOGIC IS INTENDED TO BE A PRELUDE TO LATER
   EXTENSION TO P-VALUED LOGIC. THE TWO MAJOR
   APPROACHES FOLLOWED ARE: (1) DERIVING SUITABLE
   TERNARY ALGEBRA SYSTEMS WHICH INCLUDE PROPERTIES
   DESIRABLE FOR MINIMIZING LOGIC EXPRESSIONS, AND
   (2) DEVISING METHODS FOR EXPRESSING TERNARY
   FUNCTIONS IN FORMS SUITABLE FOR IMPLEMENTATION BY
   TERNARY ELEMENTS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-439 014
  OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
  AN ALGORITHM FOR SYNTHESIZING NOR LOGIC
  CIRCUITS,   (U)
      FEB 64   81P   THEADO,DONALD I
REPT. NO. 1222 21
CONTRACT: AF33 616 7843
PROJ: 4144
TASK: 414408

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER LOGIC, SYNTHESIS), DIGITAL
 COMPUTERS, CIRCUITS, NETWORKS, TRANSISTORS, SWITCHING
 CIRCUITS   (U)
IDENTIFIERS: NOR CIRCUITS, NAND CIRCUITS   (U)

  THE PROBLEM OF SYNTHESIZING NOR AND NAND LOGIC
  DIAGRAMS FOR THE GENERATION OF LOGIC FUNCTIONS IS
  STUDIED AND A TECHNIQUE IS PRESENTED. THE
  SYNTHESIS PROCEDURE IS SO DEVELOPED THAT IT CAN BE
  CARRIED OUT MANUALLY OR BY USING A DIGITAL COMPUTER.
  (AUTHOR)   (U)

8

DD   REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-601 987
  OFFICE OF NAVAL RESEARCH WASHINGTON D C
  THE LOGICAL DESIGN OF A MULTICHANNEL DEVICE FOR THE
  RETRIEVAL OF INFORMATION.   (U)
      APR 64   208P   WANNER,VANCE R. ;
MONITOR: ONR   ACR93

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFORMATION RETRIEVAL, DIGITAL
 COMPUTERS), (*COMPUTER LOGIC, DIGITAL COMPUTERS),
 MULTIPLE OPERATION, INPUT-OUTPUT DEVICES, DATA STORAGE
 SYSTEMS, DATA PROCESSING SYSTEMS, DESIGN, SEARCH
 THEORY   (U)

   THE PAPER OUTLINES A PRELIMINARY LOGICAL
   INVESTIGATION OF A DATA RETRIEVAL SYSTEM IN WHICH
   WORD BITS ARE HANDLED IN PARALLEL AND IN WHICH THE
   INTERROGATION PLAN IS NOT CONSTRAINED TO CONFORM
   NECESSARILY TO A PREORDAINED SET OF INTERROGATION
   KEYS. ALTHOUGH THE SYSTEM IS GENERALLY DESCRIBED,
   ATTENTION IS FOCUSED PRIMARILY UPON THE HEART OF THE
   SYSTEM, A COMPARATOR UNIT WHOSE PURPOSE IS TO EXTRACT
   FROM THE LARGER BODY OF STORED DATA THAT WHICH IS
   GERMANE TO ANY SPECIFIC SET OF INTERROGATION
   CRITERIA. SINCE THE TREATMENT IS NOT ORIENTED IN
   THE DIRECTION OF ANY UNIQUE USAGE, THE APPROACH IS
   QUITE GENERAL AND, FURTHERMORE, DOES NOT EXTEND INTO
   ELECTRONIC PACKAGING OR CIRCUITING. (AUTHOR)
                                                      (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-608 155
  LOCKHEED MISSILES AND SPACE CO PALO ALTO CALIF
  MULTIPLE SHIFT REGISTER REALIZATIONS OF SEQUENTIAL
  MACHINES,   (U)
      OCT 64   136P   NICHOLS,A. J. ,III,I
REPT. NO. LOCK-6-74-64-48

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTERS, SYNTHESIS), (*COMPUTER
 STORAGE DEVICES, COMPUTER LOGIC), (*COMPUTER LOGIC,
 COMPUTER STORAGE DEVICES), SWITCHING CIRCUITS,
 SEQUENCES, INPUT-OUTPUT DEVICES   (U)
IDENTIFIERS: SHIFT REGISTERS, SEQUENTIAL MACHINES,
 ALGORITHMS   (U)

  THE STUDY IS CONCERNED WITH THE PROBLEM OF
  MECHANIZING SYNCHRONOUS SEQUENTIAL MACHINES WITH
  SHIFT REGISTERS. IT IS SHOWN THAT ANY MACHINE CAN
  BE MECHANIZED WITH SHIFT REGISTERS. THE
  DETERMINATION OF THE LEAST NUMBER OF SHIFT REGISTERS
  REQUIRED IN A MECHANIZATION OF A GIVEN MACHINE IS
  INVESTIGATED. A 20-STEP ALGORITHM, SUITABLE FOR
  PROGRAMMING ON A DIGITAL COMPUTER, IS DEVELOPED WHICH
  STARTS WITH THE STATE TABLE OF THE GIVEN MACHINE AND
  YIELDS MECHANIZATIONS HAVING THE LEAST POSSIBLE
  NUMBER OF SHIFT REGISTERS. THE APPLICATION OF THE
  ALGORITHM TO SYSTEMS DESIGN IS CONSIDERED, AND A
  METHOD IS GIVEN FOR DECOMPOSING THE SYSTEM, DESIGNING
  EACH OF THE SUBMACHINES, AND THEN COMBINING THESE
  DESIGNS INTO A MECHANIZATION OF THE SYSTEM. IN
  ADDITION, IT IS DEMONSTRATED THAT THE ALGORITHM MAY
  BE APPLIED TO LOGIC SYSTEMS HAVING THREE OR MORE
  VALUES AS OPPOSED TO THE CONVENTIONAL, BINARY SYSTEM.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-613 060
  CASE INST OF TECH CLEVELAND OHIO
  LOGIC OF CONTROLLED THRESHOLD DEVICES.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
      FEB 65   250P   KLOCK,H. F. ;HANEY,R. D. ;
CONTRACT: AF30 602 2518
PROJ: 5519
TASK: 551901
MONITOR: RADC ,   TDR-64-173

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-297 862.

DESCRIPTORS: (*COMPUTER LOGIC, CONTROL SEQUENCES),
 (*CONTROL SEQUENCES, COMPUTER LOGIC), SYNTHESIS, DATA
 STORAGE SYSTEMS, GATES (CIRCUITS), DIGITAL COMPUTERS,
 MATRIX ALGEBRA   (U)
IDENTIFIERS: THRESHOLD LOGIC   (U)

  THE SYNTHESIS OF THRESHOLD LOGIC CIRCUITS FROM
  SEVERAL POINTS OF VIEW IS PRESENTED. THE FIRST
  APPROACH IS APPLICABLE TO RESISTOR-TRANSISTOR
  NETWORKS IN WHICH THE OUTPUTS ARE TIED TO A COMMON
  COLLECTOR RESISTOR. IN GENERAL, FEWER THRESHOLD
  LOGIC GATES THAN NOR GATES CONNECTED TO A COMMON
  COLLECTOR RESISTOR ARE REQUIRED. SYNTHESIS
  TECHNIQUES BASED UPON THE USE OF BOOLEAN MATRICES
  ARE PRESENTED. IN THIS CASE THE GOAL OF THE
  SYNTHESIS IS A NETWORK TO REALIZE A SPECIFIED
  FUNCTION SUCH THAT THE FAILURE OF ANY BUT THE OUTPUT
  GATE CAN BE COMPENSATED FOR BY A CHANGE IN THE
  THRESHOLD LEVEL (AND POSSIBLY CHANGES IN THE
  WEIGHTS OF THE INPUTS). IN GENERAL, THE ABILITY TO
  COMPENSATE FOR A FAILURE REQUIRES THE SYNTHESIS OF A
  NETWORK WITH MORE GATES THAN IF NO COMPENSATION WERE
  REQUIRED. THE NET RESULT IS THAT THE SYNTHESIS IS
  AN INVOLVED PROCEDURE. A MECHANISM FOR CHANGING
  WEIGHTS OF THRESHOLD GATES USING A PHOTO-DIODE MATRIX
  IS PRESENTED. THE DESIGN OF THE CONTROL SYSTEM FOR
  AN IBM TYPE 350 DISC FILE IS PRESENTED AS AN
  ILLUSTRATION OF THE DESIGN OF A PRACTICAL SYSTEM IN
  WHICH THRESHOLD LOGIC IS EMPLOYED. THE FUNCTION OF
  THE CONTROL SYSTEM IS TO POSITION THE READ-WRITE
  HEADS OVER THE SPECIFIED TRACK OF A SPECIFIED DISC TO
  READ IN OR TO READ OUT DATA. LESS LOGIC CIRCUITRY
  IS REQUIRED IF THRESHOLD LOGIC RATHER THAN NOR
  LOGIC IS USED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-614 691
  POLYTECHNIC INST OF BROOKLYN N Y MICROWAVE RESEARCH
  INST
  ON THE APPROXIMATE IDENTIFICATION OF PROCESS DYNAMICS
  IN COMPUTER CONTROLLED ADAPTIVE SYSTEMS,   (U)
    OCT 59   23P   BRAUN,L. ,JR.;MISHKIN,E. ;
  TRUXAL,J. G. ;
REPT. NO. R-745-59 ,PIB-673
CONTRACT: DA30 0690RD2646 ,DA30 0690RD1560
MONITOR: AROD ,2E   2263:

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ADAPTIVE CONTROL SYSTEMS, COMPUTER
 LOGIC), (*COMPUTER LOGIC, ADAPTIVE CONTROL SYSTEMS),
 COMMUNICATION THEORY, SIGNALS, ANALOG COMPUTERS,
 SWITCHING CIRCUITS, SPECIAL FUNCTIONS (MATHEMATICAL),
 POLYNOMIALS, TRANSFORMATIOUS (MATHEMATICS), EQUATIONS,
 SWITCHING CIRCUITS   (U)

  MODERN CONTROL SYSTEMS ARE COMPLEX AND MUST MEET
  STRINGENT PERFORMANCE REQUIREMENTS. THERE IS AN
  OBVIOUS NEED IN SUCH SYSTEMS FOR DEVELOPMENT OF
  DESIGN PROCEDURES FOR COMPUTER-CONTROLLED SYSTEMS
  WHICH MAKE USE OF THE HIGHLY DEVELOPED COMPUTER ART.
  THIS PAPER PRESENTS AN ATTEMPT TO APPLY COMPUTERS
  IN THE SOLUTION OF ONE CLASS OF SUCH SYSTEMS. THE
  REALIZATION OF THE NOVEL COMPUTER CIRCUITS REQUIRED
  IS OUTLINED, AND THE OVERALL DESIGN LOGIC IS
  PRESENTED. THE DESIGNER VERSED IN THE ART WILL
  HAVE NO DIFFICULTY INTEGRATING THE INDIVIDUAL
  CIRCUITS. IT APPEARS THAT ANALOG CIRCUITS
  INTERCONNECTED BY MEANS OF SWITCHING DEVICES WILL BE
  USEFUL IN THE REALIZATION OF THE REQUIRED COMPUTING
  CIRCUITS. THE REQUIRED COMPUTER FACILITY SEEMS TO
  BE REASONABLE, AND COMMENSURATE WITH THE CONTROL
  PROBLEM. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-616 325
  LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
  SYMMETRIC TERNARY SWITCHING FUNCTIONS; THEIR
  DETECTION AND REALIZATION WITH THRESHOLD LOGIC,   (U)
      JUN 65   76P   MERRILL,ROY DEWITT ,JR.I
REPT. NO. 6-75-65-29

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SWITCHING CIRCUITS, COMPUTER
 LOGIC), (*COMPUTER LOGIC, SWITCHING CIRCUITS),
 (*SPECIAL FUNCTIONS(MATHEMATICAL), SWITCHING
 CIRCUITS), DIGITAL SYSTEMS, DIGITAL COMPUTERS,
 NETWORKS, SYNTHESIS   (U)
IDENTIFIERS: SWITCHING FUNCTIONS   (U)

   THE IMPORTANT PROPERTIES OF SYMMETRIC FUNCTIONS ARE
   PRESENTED AND A SYSTEMATIC PROCEDURE IS DEVELOPED FOR
   DETECTING THESE FUNCTIONS. A DESIGN METHOD IS
   GIVEN WHEREBY SYMMETRIC FUNCTIONS CAN BE SYNTHESIZED
   WITH NETWORKS WHICH ARE ECONOMICAL AND, IN CERTAIN
   INSTANCES, MINIMAL IN THE NUMBER OF TERNARY THRESHOLD
   DEVICES REQUIRED. THE PRACTICAL CONSEQUENCES OF
   THESE RESULTS ARE DEMONSTRATED BY APPLYING DETECTION
   AND LOGIC DESIGN TECHNIQUES TO A TYPICAL DIGITAL
   SYSTEM PROBLEM.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-617 298
  ILLINOIS UNIV URBANA
  SYNTHESIS OF THREE-LEVEL LOGIC CIRCUITS WITH
  APPLICATION TO A RADIX THREE COMPUTER ARITHMETIC
  UNIT.   (U)
DESCRIPTIVE NOTE: MASTER'S THESIS,
    MAY 65   61P   ROZMARICH,THOMAS ALOIS :

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER LOGIC, SYNTHESIS),
 (*CIRCUITS, COMPUTER LOGIC), DIGITAL COMPUTERS,
 SWITCHING CIRCUITS, DESIGN, CONTROL SEQUENCES   (U)

  IT IS KNOWN THAT THE USE OF A LARGER RADIX IN A
  DIGITAL COMPUTER WILL RESULT IN THE SPEEDING UP OF
  ARITHMETIC OPERATIONS WHERE THE NUMBER OF RECURSIVE
  STEPS IS REDUCED WITH A LARGER RADIX. ONE PROBLEM
  ENCOUNTERED WHEN GOING TO HIGHER RADICES INVOLVES THE
  VOLTAGE REPRESENTATION OF THE DIGITAL VALUES, WHICH
  MAY LEAD TO THE NEED OF ADDITIONAL CIRCUITRY JUST TO
  BE ABLE TO DISTINGUISH BETWEEN THE VARIOUS VOLTAGE
  LEVELS. TERNARY LOGIC HAS BEEN SUGGESTED AS A
  MEANS OF CONTROLLING TIMING IN SEQUENTIAL CIRCUITRY.
  ADDER CIRCUITS ARE PRESENTED FOR USE IN A RADIX
  THREE COMPUTER, AND, ALSO THREE LEVEL LOGIC
  OPERATIONS WHICH HAVE A MORE GENERAL APPLICATION.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-619 894
  CALIFORNIA UNIV LOS ANGELES DEPT OF ENGINEERING
  THE LOGICAL DESIGN OF A TRANSFER PATH FOR THE
  VARIABLE STRUCTURE COMPUTER SYSTEM,   (U)
      JUL 65   243P   HOPKINS,DONN ARTHUR I
REPT. NO. 65-16
CONTRACT: NONR23352

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COUPLING CIRCUITS, COMPUTER
 LOGIC), (*COMPUTER LOGIC, SYSTEMS ENGINEERING),
 (*SYSTEMS ENGINEERING, COMPUTER LOGIC), (*DIGITAL
 COMPUTERS, SYSTEMS ENGINEERING), DATA PROCESSING
 SYSTEMS, DATA TRANSMISSION SYSTEMS, CONTROL
 SEQUENCES, MULTIPLE OPERATION,
 PROGRAMMING(COMPUTERS), GATES(CIRCUITS)   (U)
IDENTIFIERS: IBM 7094   (U)

  THE TRANSFER PATH IS A BUFFER UNIT THAT WILL BE
  USED TO DIRECT COUPLE AN IBM 7094 TO THE VARIABLE
  STRUCTURE COMPUTER. IN ADDITION TO BUFFERING,
  THE TRANSFER PATH, TP, ALLOWS THE VARIABLE
  STRUCTURE COMPUTER, V, TO CONTROL THE RATE AND
  DIRECTION OF 7094 COMPUTATION. TWO ONECYCLE
  TRANSFERS EXECUTED BY THE 7094 ARE CONDITIONAL UPON
  INFORMATION CONTAINED IN V. THE TP CAN
  ELECTRONICALLY STOP OR START THE 7094 AT ANY TIME;
  7094 TRAPS MAY BE INITIATED BY V THROUGH THE TP.
  A NUMBER OF MODIFICATIONS TO 7094 LOGIC WERE
  REQUIRED TO OBTAIN THE DESIRED OPERATION; A
  DESCRIPTION OF THESE MODIFICATIONS HAS NOT BEEN
  INCLUDED IN THIS REPORT. REFERENCE IS MADE TO THE
  7094 LOGIC PAGES WHERE TP SIGNALS ARE INTRODUCED.
  THE REPORT CONSISTS OF EIGHT CHAPTERS. CHAPTER
  I IS AN INTRODUCTION TO THE VARIABLE STRUCTURE
  COMPUTER AND A STATEMENT OF DESIGN OBJECTIVES.
  CHAPTER II DESCRIBES WHAT THE TP DOES AND HOW
  IT INTERACTS WITH THE 7094. CHAPTER III IS A
  USER'S MANUAL FOR THE TP. CHAPTER IV CONCERNS
  DATA TRANSMISSION RATES AND INCLUDES A DISCUSSION OF
  7094 INSTRUCTION OVERLAP. CHAPTERS V THROUGH
  VIII ARE A DESCRIPTION OF THE TP LOGIC. THE
  MATERIAL INCLUDES A DESCRIPTION OF THE LOGICAL
  ELEMENTS, A SET OF SEQUENCE AND TIMING CHARTS, A SET
  OF LOGICAL EQUATIONS, IMPLEMENTED LOGIC DIAGRAMS, AND
  A BRIEF DESCRIPTION OF THE PACKAGING. THE READER
  MUST BE FAMILIAR WITH THE 7094 LOGIC BEFORE IT IS
  POSSIBLE TO UNDERSTAND THE DETAILS OF THE TP LOGIC.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-621 976
   NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF
   AN EXPERIMENTAL STUDY OF THE USES OF TERNARY LOGIC IN
   DIGITAL COMPUTERS.   (U)
DESCRIPTIVE NOTE: MASTER'S THESIS,
          64   92P   FRIICHTENICHT,RICHARD O. I

       UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*DIGITAL COMPUTERS, COMPUTER
 LOGIC), (*COMPUTER LOGIC, DIGITAL COMPUTERS),
 BINARY ARITHMETIC, GATES(CIRCUITS), SWITCHING
 CIRCUITS, ALGEBRAS   (U)
IDENTIFIERS: BINARY DIGITS, TERNARY SWITCHING
 CIRCUITS, TRUTH TABLES   (U)

   DIGITAL COMPUTERS PRESENTLY IN PRODUCTION ARE ALL
   BINARY LOGIC MACHINES, IN THAT THEY ARE BUILT WITH
   ELEMENTS THAT HAVE TWO STABLE STATES. GREATER
   EFFICIENCY IN COMPUTER SPEED AND HARDWARE WOULD BE
   OBTAINED IF ELEMENTS WITH OTHER THAN TWO STATES WERE
   USED. ATTEMPTS ARE NOW IN PROGRESS TO FIND DEVICES
   THAT HAVE THIS PROPERTY. THE NEXT LOGICAL STEP
   BEYOND BINARY WOULD BE TERNARY. A STUDY OF TERNARY
   ALGEBRAS IS MADE WITH EMPHASIS ON COMPUTER
   APPLICATIONS. FUNCTIONAL COMPLETENESS AND
   EXPANSION THEOREMS ARE INTRODUCED TO SHOW THEIR
   USEFULNESS IN COMPUTER DESIGN. AN ADDER CIRCUIT
   USING THREE LEVEL LOGIC IS DESCRIBED AND A MEASURE OF
   EFFECTIVENESS USING COST AND COMPLEXITY AS CRITERIA
   IS MADE. IT CAN BE PREDICATED THAT, AS THE BINARY
   COMPUTER APPROACHES ITS ULTIMATE IN SPEED, MORE
   ATTENTION WILL BE PLACED ON N-VALUED LOGIC
   MACHINES. (AUTHOR)   (U)

AD-643 178   9/2
  STANFORD RESEARCH INST MENLO PARK CALIF
  CELLULAR ARRAYS FOR LOGIC AND STORAGE.   (U)
DESCRIPTIVE NOTE: FINAL REPT., 30 JUN 64-31 MAR 66,
     APR 66   326P   MINNICK,R. C. ISHORT,R. A. I
  GOLDBERG,J. ISTONE,H. S. IGREEN,M. W. I
CONTRACT: AF 19(628)-4233
PROJ: SRI-5087 ,AF-4641
TASK: 464101
MONITOR: AFCRL   66-613

         UNCLASSIFIED REPORT

DESCRIPTORS: (•COMPUTER LOGIC, DESIGN),
  (•COMPUTER STORAGE DEVICES, DESIGN), MATHEMATICAL
  ANALYSIS, CASCADE STRUCTURES, FUNCTIONS   (U)
IDENTIFIERS: TURING MACHINE   (U'

  THE REPORT PRESENTS THE RESULTS OF A SECOND PROJECT
  OF RESEARCH ON CELLULAR LOGIC. THE OBJECTIVE OF
  THE RESEARCH HAS BEEN TO DEVELOP TECHNIQUES FOR THE
  EFFICIENT REALIZATION OF GENERAL LOGICAL FUNCTIONS IN
  MICROCELLULAR ARRAYS--I.E., CELLULAR ARRAYS IN WHICH
  THE CELLS CONTAIN A SMALL NUMBER OF GATES. THE
  REPORT IS IN SEVEN CHAPTERS. THE SUBJECTS OF THE
  CHAPTERS ARE (I) INTRODUCTION, (II) ORGANIZATION
  OF NEW CELLULAR ARRAYS, AND ANALYSIS OF FAULT
  AVOIDANCE SCHEMES, (III) MATHEMATICAL ANALYSIS OF
  CASCADES AND DERIVATION OF DECOMPOSITION ALGORITHMS,
  (IV) TECHNIQUES FOR PRACTICAL LOGICAL DESIGN USING
  CELLULAR ARRAYS, (V) A PROCEDURE FOR COMPUTER-AIDED
  DESIGN OF CELLULAR ARRAYS, (VI) DESIGN OF A
  CELLULARLY-ORGANIZED TURING MACHINE, AND (VII)
  SUMMARY AND SUGGESTIONS FOR FURTHER WORK.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-649 413   9/2
    FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
    METHOD OF ACCOMPLISHING LOGIC OPERATIONS WITH COMPLEX
    SETS OF SYMBOLS.   (U)
        JAN 67   8P   GUTENMAKHER,L. I. :
REPT. NO. FTD-HT-67-4

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF
 PATENT (USSR) 151 882, APPL. 757936/26/24, 30 DEC
 61.

DESCRIPTORS: (*COMPUTER LOGIC, *SWITCHING
 CIRCUITS), COMPUTER STORAGE DEVICES, DATA
 STORAGE SYSTEMS, DATA PROCESSING SYSTEMS,
 SYMBOLS
                                                    (U)

  THE PAPER BRIEFLY DESCRIBES A FAST LOGIC CIRCUIT,
 ACHIEVED BY CONNECTING THE LOGIC SWITCHES 'AND'
 'OR' AND 'NOR', AND THE MEMORY COMPONENTS IN AN
 N-DIMENSIONAL NETWORK OF A FREELY CHOSEN SYSTEM.
 THE TYPICAL OPERATIONS QUOTED ARE: SURVEY AND
 CALCULATIONS OF THREE DIMENSIONAL FIGURES,
 DETERMINATION OF THE FIGURE CONTOURS, DETERMINATION
 OF THE CURVES CREATED BY THE INTERSECTION OF TWO
 DIFFERENT FIGURES AND SIMILAR. THE DIAGRAM WHICH
 IS IN THE TEXT SHOWS ONLY A SIMPLIFIED OUTLINE OF
 CONNECTIONS, ONLY THE JOINTS OF THE OUTER CELLS ARE
 ILLUSTRATED. THE FIRST TWO MEMORY COMPONENTS (N
 SUB 1 AND N SUB 2) ACCEPT MEMORIZE THE BINARY SIGNS
 '1' AND '0' FROM THE SIMILAR CELLS OF THE MEMORY
 CIRCUIT. THE THIRD COMPONENT (N SUB 3 ACCEPTS
 AND MEMORIZES THE RESULT OF THE LOGIC OPERATION FROM
 THE SWITCH (K) AND PASSES IT ACCORDING TO THE
 COMMAND EITHER TO THE CELL OF THE MEMORY CIRCUIT OR
 TO THE COMPONENT (N SUB 2). THE ARRANGEMENT
 CAN BE MADE FOUR- OR FIVE-DIMENSIONAL, USING VARIOUS
 MAGNETIC, CAPACITIVE AND SEMICONDUCTOR COMPONENTS.
 (AUTHOR)
                                                    (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-654 401   9/2
   JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS
   LAB
   DREAC DRUM EXPERIMENTAL AUTOMATIC COMPUTER:
   OPERATIONAL CHARACTERISTICS AND LOGICAL DESIGN,   (U)
       FEB 59   83P   CARRUTH,DONALD E. ;
REPT. NO. CF-2782
CONTRACT: NORD-7386

       UNCLASSIFIED REPORT

DESCRIPTORS: (*DIGITAL COMPUTERS, COMPUTER
LOGIC), COMPUTER STORAGE DEVICES, CODING, REAL
TIME, SHIFT REGISTERS, INPUT-OUTPUT DEVICES,
DATA STORAGE SYSTEMS, DATA PROCESSING SYSTEMS   (U)
IDENTIFIERS: DREAC   (U)

   THE REPORT COMPRISES 4 MAIN SECTIONS, LABELED:
   (I) GENERAL INFORMATION; (II) OPERATIONAL
   CHARACTERISTICS; (III) SPECIAL TOPICS; (IV)
   LOGICAL DESIGN. SECTION (I) DESCRIBES THE
   THEORY OF OPERATION AND THE NUMBER SYSTEM EMPLOYED.
   IT ALSO GIVES DETAILS OF THE DRUM MEMORY AND THE
   A/C SECTION. SECTION (II) GIVES A DETAILED
   DESCRIPTION OF THE OPERATIONS PERFORMED DURING EACH
   TYPE OF COMMAND. IT ALSO PRESENTS A MATHEMATICAL
   OR SYMBOLIC DESCRIPTION OF THE OPERATION OF DREAC
   IN ALL COMMANDS. SECTION (III) PRESENTS SPECIAL
   INFORMATION OF THE TYPE NEEDED BY THE PROGRAMMER.
   IT INCLUDES ROUNDING, REPRESENTATION OF ZERO,
   OVERFLOW AND THE LIKE. SECTION (IV) IS THE BULK
   OF THE REPORT. IT GIVES IN DETAIL THE LOGICAL
   EQUATIONS WHICH DESCRIBE EXACTLY THE MODUS OPERANDI
   OF DREAC, EXPLANATIONS ACCOMPANY THE EQUATIONS.
   THE EXPLANATIONS ARE AIMED AT THE READER WITH MORE
   THAN A CURSORY ACQUAINTANCE WITH LOGICAL DESIGN.
   (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA04ء3

AD-661 089   9/2   20/6
  BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS
  A QUANTUM OPTICAL PHENOMENON: IMPLICATIONS FOR
  LOGIC.   (U)
DESCRIPTIVE NOTE: FINAL REPT. APR 64-MAR 66,
     NOV 67   20P   RING,E. M. ;FOX,H. L. ;
  CLAPP,L. C. ;
REPT. NO. BBN-1562
CONTRACT: NONR-4445(00)
TASK: NR-048-192/12-28-64

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN OPTICAL AND ELECTRO-
  OPTICAL INFORMATION PROCESSING P31-43 1965.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH BOSTON
  UNIV., MASS.

DESCRIPTORS: (*COMPUTER LOGIC, OPTICAL
 PHENOMENA), (*PUMPING(OPTICAL), RUBIDIUM),
 ATOMIC ENERGY LEVELS, EXCITATION, PHOTONS,
 ZEEMAN EFFECT, STARK EFFECT, MAGNETIC FIELDS,
 RESONANCE, DATA PROCESSING SYSTEMS   (U)
IDENTIFIERS: OPTICAL COMPUTERS, DITHER EFFECT   (U)

  THERE ARE TWO APPROACHES THAT CAN BE TAKEN IN THE
  SEARCH FOR NEW DEVICES AND TECHNIQUES FOR DIGITAL
  INFORMATION PROCESSING. ONE APPROACH CONSISTS OF
  HAVING AN 'A PRIORI' CONCEPTION OF A LOGIC STRUCTURE
  FOR THE IMPLEMENTATION OF GENERAL LOGICAL STATEMENTS.
  THE OTHER APPROACH IS TO EXAMINE APPROPRIATE
  DEVICES AND PHYSICAL PROCESSES AND TO DETERMINE WHICH
  LOGICAL STATEMENTS THEY MIGHT REPRESENT. THE FIRST
  APPROACH IS THE MOST COMMON. IT IS USUAL TO REDUCE
  ALL LOGICAL STATEMENTS TO BOOLEAN ALGEBRA AND THEN
  TO SEEK DEVICES AND PHYSICAL PROCESSES WHICH WILL
  PERFORM THE FUNCTION OF A BINARY 'STORE' OR 'NOR' OR
  'AND', ETC. THIS MORE COMMON APPROACH HAS THE
  OBVIOUS ADVANTAGE THAT ONE CAN CONCERN HIMSELF ONLY
  WITH DEVICES AND NEED NOT CONSTRUCT A NEW ALGEBRA OF
  LOGICAL STATEMENTS. HOWEVER, AS NEW PHYSICAL
  PROCESSES AND RESULTANT DEVICES ARE EXPLORED, SUCH AN
  APPROACH MAY RESULT IN AN INEFFICIENT UTILIZATION OF
  THESE NEW TECHNIQUES. THE ALTERNATE APPROACH IS
  EXPLORED IN THE PRESENT PAPER. WE EXAMINE A
  PHYSICAL PROCESS WHICH WE BELIEVE HAS THE POTENTIAL
  FOR HIGH-SPEED AND ACCURATE OPTICAL INFORMATION
  PROCESSING. WE THEN EXAMINE SOME OF THE LOGICAL
  FUNCTIONS SUCH A DEVICE COULD PERFORM. IN
  INVESTIGATING THESE WE ATTEMPT TO AVOID ANY 'A
  PRIORI' BIAS FOR THE REALIZATION OF BINARY LOGIC.
  (AUTHOR)   (U)

DOC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-665 332   9/2
  MONTANA STATE UNIV BOZEMAN ELECTRONICS RESEARCH LAB
  A CELLULAR COMPUTER ORGANIZATION FOR MATRIX
  OPERATIONS,   (U)
      SEP 67   12P   MINNICK,ROBERT C. ;
  CANNON,LYNN E ;
CONTRACT: N00014-67-C-0477
PROJ: ERL-R-0009-603

          UNCLASSIFIED REPORT

DESCRIPTORS: (*DIGITAL COMPUTERS, MATRIX
 ALGEBRA), (*COMPUTER LOGIC, DESIGN), VECTOR
 ANALYSIS, ALGORITHMS, COMPUTER STORAGE DEVICES,
 CONTROL SEQUENCES, SPECIAL PURPOSE COMPUTERS   (U)

  THE DISCRETE KALMAN FILTER APPEARS TO BE A
  NATURAL FORM FOR REALIZATION IN A SPECIALLY ORGANIZED
  CELLULAR COMPUTER. A LARGE NUMBER OF VECTOR AND
  MATRIX OPERATIONS IS REQUIRED, SUGGESTING THAT
  EFFICIENCY IN SUCH OPERATIONS IS A KEY FACTOR IN
  OVERALL MACHINE FUNCTION. THIS PAPER PRESENTS A
  POSSIBLE STRUCTURE FOR A VECTOR AND MATRIX OPERATIONS
  SUBSECTION OF SUCH A COMPUTER AND ILLUSTRATES
  SPECIFICALLY MATRIX MULTIPLICATION BASED ON AN
  ALGORITHM DEVISED BY THE AUTHOR. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA04A3

AD-668 085   9/2
  STANFORD RESEARCH INST MENLO PARK CALIF POULTER LABS
  PROPERTIES OF CELLULAR ARRAYS FOR LOGIC AND
  STORAGE.   (U)
DESCRIPTIVE NOTE: FIN'L REPT. 14 JAN 66-13 OCT 67,
     NOV 67   61P   ELSPAS, BERNARD ;
  KAUTZ, WILLIAM H. ; STONE, HAROLD S. ;
CONTRACT: AF 19(628)-5828
PROJ: AF-4641, SRI-5876
TASK: 464101
MONITOR: AFCRL   68-0005

        UNCLASSIFIED REPORT

DESCRIPTORS: (*COMPUTER LOGIC, CIRCUITS),
 COMPUTER STORAGE DEVICES, DIGITAL SYSTEMS,
 NETWORKS, DETECTORS, MODULES(ELECTRONICS),
 MANUFACTURING METHODS, MATHEMATICAL ANALYSIS,
 TABLES   (U)

  THE REPORT PRESENTS FINAL RESULTS OF A THIRD
  PROJECT COVERING RESEARCH ON CELLULAR LOGIC
  TECHNIQUES. THE OBJECTIVE OF THE RESEARCH HAS BEEN
  TO DEVELOP TECHNIQUES FOR THE EFFICIENT REALIZATION
  OF GENERAL LOGICAL FUNCTIONS IN CELLULAR ARRAYS.
  THE REPORT COVERS THE SUBJECTS OF CELLULAR CASCADES
  AND RELATED NETWORKS: STUDIES OF UNIVERSAL LOGIC
  MODULES: PROGRAMMED-LOGIC ARRAYS: DIAGNOSIS AND
  TESTING OF CELLULAR ARRAYS: SAMPLED-SEQUENCE
  DETECTORS, SERIAL UNIVERSAL LOGIC MODULES, AND
  ITERATIVE MULTIRAIL CASCADES. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZA0463

AD-801 357   9/2   9/5
  TEXAS UNIV AUSTIN LABS FOR ELECTRONICS AND RELATED
  SCIENCE RESEARCH
  AN ADAPTIVE THRESHOLD LOGIC GATE USING CAPACITIVE
  ANALOG WEIGHTS.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
      AUG 66   44P   SMITH,JOHN R, , JR.:
  HARBOURT,CYRUS O. :
REPT. NO. TR-22
CONTRACT: AF-AFOSR-766-66
MONITOR: AFOSR   66-2532

          UNCLASSIFIED REPORT

DESCRIPTORS: (*SWITCHING CIRCUITS, *COMPUTER
 STORAGE DEVICES), (*LEARNING MACHINES, COMPUTER
 LOGIC), ANALOG SYSTEMS, ADAPTIVE SYSTEMS,
 INTEGRATED CIRCUITS, GATES(CIRCUITS). TRAINING
 DEVICES   (U)

  A TRAINABLE ADAPTIVE THRESHOLD LOGIC GATE IS
  DESCRIBED. A REVIEW OF BASIC THEORY OF THRESHOLD
  LOGIC IS PRESENTED ALONG WITH A DESCRIPTION OF A
  TRAINING TECHNIQUE. CAPACITORS CAPABLE OF
  EXHIBITING LONG TERM ANALOG MEMORY ARE USED IN THE
  PHYSICAL REALIZATION OF AN ADAPTIVE THRESHOLD LOGIC
  GATE. A DESCRIPTION OF BOTH THE CAPACITIVE ANALOG
  MEMORY AND THE TRAINABLE GATE IS GIVEN. TRAINING
  RESULTS OF THE ADAPTIVE THRESHOLD DEVICE ARE
  EXHIBITED FOR TEN DIFFERENT LINEARLY SEPARABLE
  SWITCHING FUNCTIONS. SOME PRACTICAL DISCREPANCIES
  BETWEEN IDEAL OPERATION AND CIRCUIT OPERATION ARE
  DISCUSSED. SUGGESTIONS FOR FUTURE STUDIES AND
  CIRCUIT IMPROVEMENTS ARE GIVEN. (AUTHOR)   (U)

BIOLOGICAL   INFORMATION   HANDLING

DOC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-416 201
  MELPAR INC FALLS CHURCH VA
  A STUDY OF GENERALIZED MACHINE LEARNING.   (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT. FEB 62-JUNE
  63,
     AUG 63   228P   FUHR,WILLIAM H.;
CONTRACT: AF33 616 7682
PROJ: 4160
TASK: 416004
MONITOR: ASD   TDR63 714

          UNCLASSIFIED REPORT

DESCRIPTORS: (*TEACHING MACHINES, BIONICS),
  IONICS, ANALYSIS), (*COMPUTERS, ARTIFICIAL
  INTELLIGENCE), EFFECTIVENESS, CYBERNETICS,
  TEST METHODS, COMPUTER LOGIC, PERCEPTION,
  SENSORY MECHANISM, NERVE CELLS, PSYCHOLOGY,
  SIMULATION, MAN, VISION, VISUAL ACUITY.   (U)
IDENTIFIERS: MARKOV PROCESS, SOBLN (SELF-ORGA
  NIZING BINARY LOGICAL NETWORK), MAZE
  VEHICLE, 1963.   (U)

  THE TRAINING PROCESS HAS BEEN ANALYZED AS A
  MARKOV PROCESS IN A FINITE STATE MACHINE. A
  VECTOR REPRESENTATION OF MACHINE INPUTS AND OUTPUTS
  IS DEVELOPED AND A METHOD OF DETERMINING THE TRANSI
  TION MATRIX USING THIS REPRESENTATION IS PRESENTED.
  METHODS ARE PRESENTED FOR CALCULATING THE MEAN
  LEARNING TIME FROM THE TRANSITION MATRIX. USING
  CHARACTERISTICS OF THE TRANSITION MATRIX, A THEOREM
  IS PROVED WHICH ESTABLISHES THE CRITERION FOR A
  STATIONARY PROBABILITY DISTRIBUTION OF STATES. A
  METHOD IS ALSO PRESENTED FOR REDUCING THE SIZE OF A
  TRANSITION MATRIX BY COMBINING EQUIVALENT STATES.
  CRITERIA FOR IDENTIFYING EQUIVALENT STATES ARE
  DEFINED. THE TRAINING PROCESS IS INVESTIGATED WITH
  BOTH STATIONARY AND NON-STATIONARY ENVIRONMENTS.
  WITH THE STATIONARY ENVIRONMENT ATTENTION IS
  FOCUSED ON STABILITY AND ORGANIZABILITY REQUIREMENTS
  IN THE TRAINING PROCESS. AN ALGEBRAIC FORMULATION
  OF MACHINE-ENVIRON MENT INTERACTION IN A NON-
  STATIONARY ENVIRONMENT IS ALSO PRESENTED. NUMEROUS
  EXAMPLES OF TRAINING WITH DIFFERENT TYPES OF BUILDING
  BLOCKS AND DIFFERENT GOAL CRITERIA ARE PROVIDED AND
  VARIOUS BUILDING BLOCKS ARE EVALUATED AS TO THEIR EF
  FICIENCY IN FORMING LOGICAL CONNECTIVES. SIMULA
  TION OF HUMAN DEPTH PERCEPTION USING SIZE AND RETINAL
  DISPARITY CUES DEMONSTRATED THE ABILITY OF THE
  NETWORK TO ORGANIZE SO AS TO MAKE OPTIMAL USE OF
  AVAILABLE INFORMATION. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB04₃3

AD-435 982
    AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
    1963 BIONICS SYMPOSIUM 19-20-21 MARCH, INFORMATION
    PROCESSING BY LIVING ORGA' 'HS AND MACHINES.   (U)
        MAR 64   360P
REPT. NO. ASD-TDR-63-946

            UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BIONICS, SYMPOSIA), (*SYMPOSIA,
 BIONICS), (*ARTIFICIAL INTELLIGENCE, MEDICAL
 RESEARCH), NETWORK, MODELS (SIMULATIONS), NERVE CELLS,
 NERVOUS SYSTEM, MATHEMATICAL MODELS, COLOR VISION,
 AUDITORY PERCEPTION, LEARNING, DATA PROCESSING
 SYSTEMS, BEHAVIOR, TRAINING DEVICES, CYBERNETICS,
 COMPUTERS, COMMUNICATION THEORY, MATHEMATICAL LOGIC (U)
 IDENTIFIERS: 1963   (U)

  THIS REPORT COMPILES PAPERS PRESENTED IN THE
  INVITED SESSIONS AT THE BIONICS SYMPOSIUM 1963
  HELD 19-21 MARCH 1963 AT DAYTON, OHIO. THESE
  SESSIONS ARE DEVOTED TO THE SUBJECT INFORMATION
  PROCESSING BY LIVING ORGANISMS AND MACHINES
  AND HAVE THE FOLLOWINT TITLES: I. GENERAL
  SESSION; II. SIGNAL RECEPTION BY LIVING
  ORGANISMS; III. INFORMATION PROCESSING BY
  LIVING ORGANISMS; IV. PHYSICAL PRINCIPLES OF
  BIONICS; AND V. APPLICATION OF BIONIC
  CONCEPTS. BIOLOGICAL, MATHEMATICAL, AND
  ENGINEERING PAPERS ARE EQUALLY REPRESENTED ATTACKING
  THE PROBLEM OF UNDERSTANDING AND SIMULATING THE
  SOPHISTICATED INFORMATION PROCESSING CAPABILITIES OF
  LIVING ORGANISMS BY ARTIFICIAL MEANS. (AUTHOR)
                                                    (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. Z80463

AD-602 073
  RAND CORP SANTA MONICA CALIF
  A DIGITAL-COMPUTER MODEL OF NERVE-CELL
  FUNCTIONING.   (U)
      JUN 64   49P   PERKEL,DONALD H. ;
REPT. NO. RM-4132NIH
CONTRACT: PHS GM09608 03

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NERVE CELLS, BIONICS), (*MATHEMATICAL
 MODELS, NERVE CELLS), (*BIONICS, NERVE CELLS),
 CYBERNETICS, PROGRAMMING (COMPUTERS), DIGITAL
 COMPUTERS, SIMULATION, NERVOUS SYSTEM, CELLS
 (BIOLOGY), CYTOLOGY   (U)

  A MATHEMATICAL MODEL OF NERVE-CELL FUNCTIONING IS
  DESCRIBED. THIS MODEL IS EMBODIED IN DIGITAL-
  COMPUTER PROGRAMS WHICH SIMULATE THE BEHAVIOR OF
  NERVE CELLS, THEIR INTERCONNECTING FIBERS, AND
  EXTRINSIC SOURCES OF IMPULSES. THE SIMULATION
  UTILIZES A CONTINUOUS TIME PARAMETER.
  INVESTIGATIONS USING THIS MODEL HAVE BEEN CONDUCTED
  IN CLOSE COLLABORATION WITH EXPERIMENTAL
  NEUROPHYSIOLOGISTS. THE PHYSIOLOGICAL CONTENT OF
  THE MODEL IS DISCUSSED BY TRACING A NERVE IMPULSE AS
  IT IS CONDUCTED ALONG AN AXON, AND AS IT OCCASIONS
  THE RELEASE OF A TRANSMITTER SUBSTANCE AT A SYNAPSE,
  INTERACTS WITH THE TRANSMEMBRANE POTENTIAL OF THE
  POSTSYNAPTIC CELL, UNDERGOES SPATIAL AND TEMPORAL
  INTEGRATION WITH OTHER POSTSYNAPTIC POTENTIALS, AND
  POSSIBLY CONTRIBUTES TO THE FIRING OF THE CELL, WHICH
  UNDERGOES ABSOLUTE AND RELATIVE REFRACTORY PERIODS,
  AND PROPAGATES AN IMPULSE ALONG ITS OWN AXON.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 280463

AD-602 966
  RCA LABS PRINCETON N J
  TWO-MODE THRESHOLD LEARNING.   (U)
DESCRIPTIVE NOTE: REPT. FOR MAY-OCT 63.
      MAY 64   64P   SKLANSKY,J. J
CONTRACT: AF33 657 11336
PROJ: 7233
TASK: 723305
MONITOR: AMRL ,   TDR64 39

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MATHEMATICA   MODELS, BIONICS),
  (*TRAINING, MATHEMATICAL MODELS), (*STOCHASTIC
  PROCESSES, FEEDBACK), (*BIONICS, BEHAVIOR), ADAPTATION
  (PHYSIOLOGY), CYBERNETICS   PATTERN RECOGNITION,
  RETRAINING, COMPUTERS, CONTROL, ADJUSTMENT
  (PSYCHOLOGY), SENSORY PERCEPTION, SIMULATION,
  ENVIRONMENT, LEARNING   (U)

  IN CERTAIN 'THRESHOLD LEARNING PROCESSES'
  (TLPS) ASSOCIATED WITH PATTERN RECOGNITION AND
  SENSORY PERCEPTION, THE PROCESS OF TRAINING AN
  OBSERVER TO RECOGNIZE PATTERNS OR DISTINGUISH LEVELS
  OF SENSORY EXCITATION MAY BE MODELED BY A FINITE-
  STATE MARKOV CHAIN. THE STATISTICS OF THE
  SIGNALS RECEIVED BY THE OBSERVER MOVE AT RANDOM
  BETWEEN TWO SETS OF PARAMETERS IN A 'TWO-MODE' TLP,
  MODELED BY A TWO-MODE MARKOV CHAIN. USING A
  PROBABILISTIC MEASURE OF EFFECTIVENESS, THE
  EFFECTIVENESS OF A 'SIMPLE INCREMENTAL' FEEDBACK
  POLICY IS SHOWN TO BE GREATER FOR TWO-MODE TLPS
  THAN FOR ONE-MODE TLPS OVER A CERTAIN RANGE OF
  ENVIRONMENTAL AND STRUCTURAL STATISTICS. A METHOD
  OF DESIGNING PERIODIC TRAIN-WORK SCHEDULES FOR TWO-
  MODE TLPS IS DESCRIBED. ('TRAIN' AND 'WORK'
  CORRESPOND TO 'CLOSED-LOOP' AND 'OPEN-LOOP'
  RESPECTIVELY.) IN MANY REAL ADAPTIVE PROCESSES AN
  'RC APPROXIMATION' OF THE TRAIN-WORK DYNAMICS IS
  APPLICABLE. FOR THESE PROCESSES THE RATIO OF
  WORKING TIME TO RETRAINING TIME, YIELDING A DESIRED
  PERFORMANCE LEVEL, IS MAXIMIZED WHEN THE WORK-RETRAIN
  PERIOD IS MADE AS SMALL AS POSSIBLE. MANY
  STOCHASTIC PROCESSES PRESENT MODELING PROBLEMS OF
  NEAR PSYCHOLOGICAL COMPLEXITY. WAYS IN WHICH OPEN-
  LOOP/CLOSED-LOOP RELATIONSHIPS CAN HELP THE LIFE
  SCIENTIST OR ENGINEER MODEL ADAPTIVE STOCHASTIC
  PROCESSES BY TWO-MODE TLPS ARE INDICATED.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-608 284
    OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS
    ON THE STRUCTURE AND ORGANIZATION OF THE NERVOUS
    SYSTEM FROM AN INFORMATION PROCESSING POINT OF VIEW
    (NEURAL CODING, VISION, AND MOTOR CONTROL).   (U)
DESCRIPTIVE NOTE: FINAL REPT. FOR OCT 62-MAR 64,
      OCT 64   106P   COULTER,N. A. ,JR.;
CONTRACT: AF33 657 9660
PROJ: 7233
TASK: 723304
MONITOR: AMRL ,   TR64 80

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CENTRAL NERVOUS SYSTEM, BIONICS),
 (*BIONICS, CENTRAL NERVOUS SYSTEM), (*DATA PROCESSING
 SYSTEMS, BIONICS), NERVE CELLS, PHYSIOLOGY, VISUAL
 SIGNALS, VISUAL PERCEPTION, COLORS, IMAGES, FOCUSING,
 INTENSITY, SPACE PERCEPTION, STABILIZATION,
 SERVOMECHANICS, NEUROMUSCULAR TRANSMISSION, CEREBRAL
 CORTEX, CEREBELLUM, BRAIN, RETINA, BIOPHYSICS,
 CYBERNETICS, POSTURE, PROBABILITY, DIFFERENTIAL
 EQUATIONS   (U)
IDENTIFIERS: ELECTROPHYSIOLOGY   (U)

    A STUDY WAS MADE OF THE CENTRAL NERVOUS SYSTEM FROM
    AN INFORMATION PROCESSING POINT OF VIEW. THE STUDY
    ENTAILED A REVIEW AND CRITICAL ANALYSIS OF SEVERAL
    HUNDRED REFERENCES, AND INVOLVED A CONSIDERABLE
    AMOUNT OF RECASTING AND REORGANIZATION OF EXISTING
    KNOWLEDGE INTO THE TERMS AND CONCEPTS OF ENGINEERING,
    WITH PARTICULAR REFERENCE TO POTENTIAL BIONIC
    APPLICATIONS. THE STUDY WAS SELECTIVE RATHER THAN
    COMPREHENSIVE. THE NEURAL CODING PROBLEM WAS FIRST
    EXAMINED, THE HISTORY OF EFFORTS DEALING WITH THIS
    PROBLEM WAS REVIEWED, AND A MATHEMATICAL
    REPRESENTATION OF NEURAL SIGNALS (NEUROGRAMS) AND
    NEURAL OPERATORS WAS FORMULATED. THE PROCESSING OF
    DATA BY THE VISUAL SYSTEM WAS THEN DESCRIBED, WITH
    PARTICULAR REFERENCE TO FORM, COLOR, AND MOVEMENT
    DETECTION, THE TEMPORAL CONTINUITY OF VISUAL OBJECTS,
    IMAGE FIXATION, AUTOMATIC FOCUSSING CONTROL,
    INTENSITY CONTROL, IMAGE FUSION, DEPTH PERCEPTION,
    AND THE STABILIZATION OF VISUAL SPACE. NEXT, THE
    NEURAL CONTROL OF MOVEMENT WAS ANALYZED FROM A
    SERVOMECHANICAL VIEWPOINT. THE UNIT BIOMECHANICAL
    CONTROL SYSTEM WAS DEFINED, AND THE CORTICOSPINAL
    COMMAND OF THIS UNIT SYSTEM WAS DISCUSSED. THE
    CEREBELLAR COORDINATION AND EXTRAPYRAMIDAL
    STABILIZATION OF SEQUENCES AND COMBINATIONS OF   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB04A3

AD-610 580
  RAND CORP SANTA MONICA CALIF
  A DEFENSE OF NEURAL MODELLING,   (U)
     JAN 65   IOP   PERKEL,DONALD H. ;
  MOORE,GEORGE P. ;
REPT. NO. P-3057

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE CYBERNETIC
 SCIENCES SYMPOSIUM (2ND), THE LOS ANGELES
 INVITATIONAL ON BIOPHYSICS, HELD ON 13 OCT 64, AT THE
 UNIVERSITY OF SOUTHERN CALIFORNIA, LOS ANGELES.

DESCRIPTORS: (*BIONICS, NERVOUS SYSTEM), (*NERVOUS
 SYSTEM, MODELS (SIMULATIONS)), CYBERNETICS,
 PROGRAMMING (COMPUTERS), DIGITAL COMPUTERS,
 PHYSIOLOGY, SYMPOSIA   (U)

   AT THE SECOND CYBERNETIC SCIENCES
 SYMPOSIUM, HELD ON 13 OCTOBER, 1964, THE SPECIFIC
 UTILITY OF NEURAL MODELLING TO THE EXPERIMENTAL
 RESEARCH WORKER WAS QUESTIONED BY DR. LOUIS
 FEIN, OF PALO ALTO, CALIFORNIA. DR.
 FEIN'S WRITTEN COMMENTARY AND THE AUTHORS' RESPONSE
 ARE PRESENTED HERE IN THE BELIEF THAT THIS EXCHANGE
 HAS IMPLICATIONS BEYOND NEUROPHYSIOLOGY, EXTENDING TO
 THE CONSTRUCTION OF COMPUTER MODELS OF BIOLOGICAL AND
 OTHER COMPLEX SYSTEMS.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 7B0463

AD-613 930
  PHILCO CORP WILLOW GROVE PA BIO-CYBERNETICS LAB
  A CORRELATIONAL STUDY OF MYOPOTENTIAL RESPONSE AND
  FORCE OF MUSCLE CONTRACTION DURING VARYING ACTIVITY
  DEMANDS.   (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
      MAR 65   32P   FINLEY,F. RAY ;WIRTA,ROY
  W. ;
REPT. NO. 2386
CONTRACT: NONR429200

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BIONICS, MUSCLES), (*MUSCLES,
 ELECTRICAL PROPERTIES), CONTRACTION, PERFORMANCE
 (HUMAN), COMPUTERS, SIGNALS, MOTION, CYBERNETICS,
 CONTROL SYSTEMS, POTENTIOMETERS, ERGOMETERS,
 TACHOMETERS, ELECTRONIC RECORDING SYSTEMS,
 RELIABILITY, FORCE (MECHANICS), PROGRAMMING
 (COMPUTERS)   (U)
IDENTIFIERS: MYOPOTENTIAL RESPONSE, MYOELECTRIC
 ACTIVITY, MYOCODERS   (U)

  A MAJOR OBJECTIVE OF THE PHILCO BIO-
  CYBERNETICS ENGINEERING ACTIVITY HAS BEEN TO
  DEVELOP AN OPTIMUM DEGREE OF COMPATIBILITY BETWEEN
  MAN AND THE MACHINES WHICH HE USED TO AUGMENT HIS
  PERFORMANCE CAPACITY. ONE PHASE OF STUDY, IN THE
  PURSUIT OF THIS OBJECTIVE, HAS BEEN DEVE PED ABOUT A
  HYPOTHESIS THAT THE MYOELECTRIC ACTIVITY ASSOCIATED
  WITH MUSCULAR CONTRACTION COULD BE UTILIZED TO
  CONTROL A POWERED EXO-SKELETAL SYSTEM DESIGNED TO
  AMPLIFY ONE'S STRENGTH. THIS PHASE OF STUDY IS THE
  SUBJECT OF THIS INTERIM REPORT.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-619 704
  RAND CORP SANTA MONICA CALIF
  EXAMPLE OF A LARGE-MODEL SIMULATION OF THE BLOOD
  BIOCHEMICAL SYSTEM,   (U)
      AUG 65   33P   MALONEY,JAMES V. ,JR.;
  DEHAVEN,JAMES C. ;DELAND,EDWARD C. ;
  BRADHAM,GILBERT B. ;
REPT. NO. P-3194

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED FOR PUBLICATION IN A
 SYMPOSIUM ISSUE OF THE JOURNAL OF CHRONIC DISEASES.

DESCRIPTORS: (*BLOOD CHEMISTRY, MATHEMATICAL
 MODELS), (*BIONICS, BLOOD CHEMISTRY), COMPUTERS,
 SIMULATION, PROGRAMMING(COMPUTERS),
 RESPIRATORY SYSTEM, CHEMICAL REACTIONS, BLOOD
 PLASMA, ERYTHROCYTES, STRESS(PHYSIOLOGY),
 METABOLIC DISEASES, ACIDOSIS, HYPOTHERMIA,
 HEMATOCRIT, HEMOGLOBIN, SYMPOSIA   (U)

  THE PAPER OUTLINES A FORMAL PROCEDURE FOR
  SIMULATING CERTAIN ASPECTS OF THE BIOCHEMISTRY OF A
  VIABLE SYSTEM. THE PROCEDURE IS BASED ON A
  MATHEMATICAL MODEL AND A COMPUTER PROGRAM. THE
  PLAUSIBILITY OF CONSTRUCTING DETAILED MODELS OF LARGE
  BIOCHEMICAL SYSTEMS IS DEMONSTRATED. THE OBJECT OF
  THE PAPER IS TO DEMONSTRATE THAT A MATHEMATICAL
  PROGRAM CAN SIMULATE THE FUNCTIONS OF A SELECTED
  VIABLE SYSTEM. FOR THIS PURPOSE, A MATHEMATICAL
  MODEL OF VIABLE BLOOD KNOWN AS THE 'SF BLOOD' MODEL
  WAS CHOSEN. THE 'SF BLOOD' MODEL IS A REASONABLE
  REPRESENTATION OF THE RESPIRATORY FUNCTION OF THE
  ADULT-RESTINGMALE BLOOD.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-622 685
  PURDUE UNIV LAFAYETTE IND
  THE STUTTERING PROBLEM CONSIDERED FROM AN AUTOMATIC
  CONTROL POINT OF VIEW.   (U)
DESCRIPTIVE NOTE: DOCTORAL THESIS,
     JAN 65   126P   BUTLER,BLAINE R. ,JR.:

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*VERBAL BEHAVIOR, BIONICS),
 (*BIONICS, VERBAL BEHAVIOR), (*SPEECH,
 BIONICS), (*CYBERNETICS, VERBAL BEHAVIOR),
 PSYCHOPHYSIOLOGY, ANOMALIES, SIMULATION,
 MATHEMATICAL MODELS, COMPUTERS, THERAPY,
 BIOPHYSICS, APPLIED PSYCHOLOGY   (U)
IDENTIFIERS: STUTTERING   (U)

   THIS STUDY INVESTIGATES THE STUTTERING PROBLEM FROM
   AN AUTOMATIC CONTROL POINT OF VIEW. IN ORDER TO
   ACCOMPLISH THIS, IT WAS FIRST NECESSARY TO BUILD A
   MATHEMATICAL MODEL OF THE SPEECH SYSTEM. THIS
   MODEL WAS BASED ON A FAIRBANKS MODEL. AS A FIRST
   APPROXIMATION, EXTREME SIMPLIFICATIONS WERE MADE
   WHICH IGNORED THE TACTILE AND PROPRIOCEPTIVE FEEDBACK
   LOOPS AND ASSUMED LINEARITY OF THE VOCAL TRACT AND
   EAR IN THE NORMAL RANGE OF OPERATION. THIS
   ESSENTIALLY REDUCED THE MODEL TO A NON-LINEAR SYSTEM
   COMPOSED OF NUMEROUS TIME DELAYS AND VARIABLE GAINS.
    RIOUS INSTABILITIES IN THE SYSTEM WERE THEN
   CONSIDERED AND THEIR VALIDITY IN THE STUTTERING
   PROBLEM TESTED. THIS WAS ACCOMPLISHED BY APPLYING
   CLINICALLY TESTED TECHNIQUES, WHICH DECREASE OR STOP
   STUTTERING IN PEOPLE, TO THE MATHEMATICAL MODEL.
   THE ASSUMPTION WAS THAT IF THE TECHNIQUES WHICH
   DECREASE OR STOP STUTTERING IN PEOPLE ALSO RETURNED
   THE MODEL TO A STABLE STATE, OR NORMAL SPEECH, THEN
   THIS MODEL INSTABILITY WAS POSSIBLE CAUSE OF
   STUTTERING. THE VARIOUS THEORIES OF STUTTERING,
   THE SOCIOGENIC, PSYCHOGENIC, PHYSIOGENIC AND
   LEARNING THEORIES, WERE USED WHEN POSSIBLE TO GUIDE
   THE ANALYSIS. THIS LED TO THE CONCLUSION THAT A
   MALFUNCTION OF THE MIDDLE EAR, A VARIABLE GAIN
   DEVICE, WAS POSSIBLE CAUSE OF STUTTERING.
   (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZBO4A3

AD-635 391   6/4
  MELPAR INC FALLS CHURCH VA
  ELECTRONIC SIMULATION OF THE DYNAMICS OF EVOLVING
  BIOLOGICAL SYSTEMS.   (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.
     MAY 66   127P   JUSTICE, KEITH E. ;
  CONNELLY,EDWARD M. ;GERVINSKI,JUDY M. ;
CONTRACT: AF 33(615)-2456,
PROJ: AF-4160,
TASK: 416004,
MONITOR: AFAL   TR-66-151

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BIONICS, GENETICS), (*GENETICS,
 MATHEMATICAL MODELS), PHYSIOLOGY, SIMULATION,
 ADAPTATION(PHYSIOLOGY), MONTE CARLO METHOD,
 SURVIVAL, REPRODUCTION(PHYSIOLOGY), MUTATIONS,
 DIGITAL COMPUTERS, ANALOG SYSTEMS, OPTIMIZATION,
 PROBABILITY, MICE   (U)

  A BIONIC INVESTIGATION AND MODELING OF ORGANIC
  EVOLUTION IS DESCRIBED. THE PROJECT WAS UNDERTAKEN
  TO PROVIDE A DEEPER UNDERSTANDING OF THE ADAPTIVE
  PROCESSES INVOLVED IN ORGANIC EVOLUTION. OF
  PARTICULAR INTEREST WAS A COMPARISON OF SELF-
  ORGANIZING PROCESSES IN EVOLUTIONARY SYSTEMS AND
  ANALOGOUS PROCESSES IN TRAINABLE LOGICAL NETWORKS.
  THE BIOLOGICAL PROTOTYPE FOR THE MODEL IS THE FERAL
  HOUSE MOUSE (MUS MUSCULUS) AS IT EXISTS IN SEMI-
  :SOLATED POPULATIONS IN THE SOUTHWESTERN UNITED
  STATES. SPECIAL EMPHASIS IS GIVEN TO A BALANCED
  LETHAL GENETIC SYSTEM KNOWN TO EXIST IN THE SPECIES.
  USING MONTE CARLO TECHNIQUES, THE MODEL
  SIMULATES, FOR EACH INDIVIDUAL, SUCH EVENTS AS THE
  PROBABILITY OF SURVIVAL, MIGRATION, MATING,
  REPRODUCTION, MUTATION, GENETIC SEGREGATION, AND
  NATURAL SELECTION. IMPLEMENTATION OF THE MODEL ON
  A DIGITAL COMPUTER IS DESCRIBED. RESULTS OF
  EXPERIMENTS PERFORMED WITH THE MODEL SHOW THAT THE
  MODEL BEHAVES IN A MANNER HIGHLY ANALOGOUS TO BOTH
  THE BIOLOGICAL PROTOTYPE AND TO CERTAIN ASPECTS OF
  TRAINABLE LOGICAL NETWORKS. IMPLICATIONS AND
  THEORETICAL INVESTIGATIONS OF THE WORK FOR FUTURE
  DEVELOPMENTS IN MACHINE INTELLIGENCE ARE DISCUSSED.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-640 248   5/4   9/2
  RAND CORP SANTA MONICA CALIF
  A DIGITAL-COMPUTER MODEL OF SPIKE ELICITATION BY
  POSTSYNAPTIC POTENTIALS IN SINGLE NERVE CELLS,   (U)
       SEP 66   42P   MACGREGOR,R. J. ;
REPT. NO. RM-4877-ARPA,
CONTRACT: SD-79,ARPA ORDER-189-1

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BIONICS, NERVE CELLS), (*NERVE
 CELLS, MODELS(SIMULATIONS)), NERVE IMPULSES,
 PHYSIOLOGY, NERVOUS SYSTEM, ELECTROPHYSIOLOGY,
 MATHEMATICAL MODELS, DIGITAL COMPUTERS,
 BIOPHYSICS   (U)

  A SIMULATION OF THE INFORMATION-PROCESSING FUNCTION
  OF NERVE CELLS IS PRESENTED. THE COMPUTER MODEL
  SIMULATES THE PORTION OF THE NEURON AT WHICH SPIKE
  POTENTIALS ARE INITIATED. VALUES FOR PARAMETERS
  WERE SPECIFIED ON THE BASIS OF NEUROELECTRIC
  RECORDINGS SO THAT THE RESULTS OBTAINED MIGHT BE
  PERTINENT TO ACTUAL NERVE CELLS. TRIAL RUNS VERIFY
  THAT THE MODEL IS ACCURATELY REPRODUCING THE
  FUNCTIONAL FORMS OF NEUROELECTRIC DATA. INPUT-
  OUTPUT RELATIONS UNDER REGULAR INPUT ARE GIVEN FOR A
  WIDE RANGE OF INPUT FREQUENCY AND PULSE AMPLITUDE.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZBO4A3

AD-645 499   6/4   9/2
  BELL AEROSYSTEMS CO BUFFALO N Y
  NONLINEAR PREPROCESSING OF INPUTS TO LINEAR NEURAL
  NETS,   (U)
    OCT 66   55P   GOERNER, JOHANNES G. ;
  GERHARDT, L. A. ; POWELL, F. D. ;
REPT. NO. 9500-920059
CONTRACT: AF 49(638)-1627
PROJ: AF-9769
TASK: 976904
MONITOR: AFOSR   67-0054

        UNCLASSIFIED REPORT

DESCRIPTORS: (*BIONICS, DATA PROCESSING
 SYSTEMS), NONLINEAR SYSTEMS, INPUT-OUTPUT
 DEVICES, ADAPTIVE SYSTEMS, ANALOG SYSTEMS,
 CODING, LEARNING MACHINES, PROCESSING,
 NETWORKS   (U)

  DISCRIMINATION OF ANALOG SIGNAL PATTERNS BY LINEAR
  SINGLE-GAIN LAYER NETS CAN BE SIGNIFICANTLY IMPROVED
  BY FEEDING THE ANALOG SIGNALS INTO PREPROCESSORS THAT
  CONVERT EACH ANALOG SIGNAL TO A BINARY SIGNAL WITH M
  BITS, THUS INCREASING THE NUMBER OF GAIN ELEMENTS
  FROM N TO NM. THE NUMBER OF INPUT VECTORS TO WHICH
  AN ARBITRARILY DESIRED NET OUTPUT CAN BE ASSIGNED
  INCREASES CORRESPONDINGLY FROM N TO MN. THIS
  RESULT HOLDS FOR ANY BINARY CONVERTER WITH WORD
  LENGTH M INDEPENDENT OF THE CODE OF THE CONVERTER.
  THE NUMBER INCREASES FURTHER WITH THE RADIX Q IF A
  Q-ARY PREPROCESSOR IS EMPLOYED. THE COMMON
  QUANTIZER SHOWS PARTICULAR MERITS FOR PRACTICAL
  APPLICATIONS AS ONLY ONE OUTPUT LINE IN ANY QUANTIZER
  IS ACTIVE, THUS ALLOWING GAIN ADJUSTMENTS INDEPENDENT
  OF EACH OTHER WITHIN EACH QUANTIZER. THE
  COMBINATION OF QUANTIZER AND LINEAR NET IS REPORTED
  ON IN DETAIL. WITH A FORCED LEARNING-TYPE TRAINING
  ALGORITHM, FINAL GAIN VALUES ARE SHOWN TO REPRESENT
  THE DIFFERENCE OF THE CONDITIONAL PROBABILITIES OF
  THE INPUT PATTERN CLASSES. THE COMBINATION OF
  QUANTIZER AND LINEAR NET INSTRUMENTS A TYPE OF
  LIKELIHOOD RATIO, WITH AN ERROR-CORRECTING
  TRAINING ALGORITHM, THE FINAL GAINS FORM A GAIN
  VECTOR SUCH THAT THE ERROR WITH RESPECT TO THE
  DESIRED OUTPUT FOR EACH CLASS BECOMES MINIMIZED IN
  THE LEAST MEAN SQUARE SENSE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-646 115   6/2
  OSLO UNIV (NORWAY) NEUROPHYSIOLOGICAL LAB
  RHYTHMIC ACTIVITY IN A SIMULATED NEURONAL
  NETWORK.   (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
     JAN 66   13P   ANDERSEN,P. ;GILLOW,M. ;
  RUDJORD,T. ;
CONTRACT: AF-EOAR-10-65
PROJ: AF-9777
TASK: 977701
MONITOR: AFOSR   67-0207

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN J. PHYSIOL. V185 PH:8-28
  1966.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH BERGEN
  UNIV. (NORWAY). DEPT. OF GEOPHYSICS.

DESCRIPTORS: (*BIONICS, *NERVOUS SYSTEM), NERVE
  CELLS, DIGITAL COMPUTERS, PROBABILITY, NERVE
  IMPULSES, ELECTROPHYSIOLOGY, THALAMUS,
  RHYTHM(BIOLOGY), COMPUTER PROGRAMS,
  SIMULATION   (U)

  AN IMMEDIATE FINDING IN THE COMPUTER WRITE-OUT WAS
  A GREAT TENDENCY TO INITIAL RHYTHMICITY. ALTHOUGH
  THIS MIMICS THE RHYTHMIC ACTIVITY THAT CAN BE SEEN IN
  THE ANIMAL THALAMUS IN RESPONSE TO A SINGLE,
  SYNCHRONOUS AFFERENT NERVE VOLLEY, THE RESULTS CAN
  NOT BE TAKEN AS INDICATING THAT THE NETWORK IS
  OPERATING AS THE ANIMAL THALAMUS. WITH THE PROGRAM
  USED IN THE PRESENT SERIES OF EXPERIMENTS, THE START
  OF THE COMPUTER IS COMPARABLE TO THE DISCHARGE OF A
  GREAT NUMBER OF CELLS OF THE NETWORK.
  CONSEQUENTLY, MANY CELLS ARE IN A STATE OF
  INCREASED PROBABILITY OF DISCHARGE (PD) AFTER THE
  INHIBITORY PERIOD THAT FOLLOWS THE INITIAL DISCHARGE.
  THEREFORE, THE FIRST FEW PERIODS OF RHYTHMIC
  DISCHARGE ARE NOT MORE THAN CAN BE ANTICIPATED.
  THESE RESULTS NEITHER SUPPORT NOR CONTRADICT THE
  THEORY ADVANCED FOR THE OCCURRENCE OF THE INITIAL
  BURST DISCHARGES IN THE THALAMUS (ANDERSEN AND
  ECCLES, 1962). MORE INTERESTING RESULTS WERE
  OBTAINED FROM ANALYSIS OF THE FLUCTUATIONS OF THE
  DISCHARGES AFTER THE INITIAL TRANSIENT RESPONSE OF
  THE SYSTEM. AFTER A STAGE OF ALMOST RANDOM
  ACTIVITY, THERE OCCURRED PERIODS OF RHYTHMIC
  ACTIVITY, APPARENTLY SPONTANEOUS. THESE PERIODS
  BOTH STARTED AND ENDED GRADUALLY, VERY SIMILAR TO
  THOSE PERIODS OF SPONTANEOUS ACTIVITY THAT CAN BE
  RECORDED FROM THE ANIMAL AND HUMAN THALAMUS AND
  CEREBRAL CORTEX. THUS, A SIMULATED NETWORK, WITH   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 280463

AD-646 441   9/2   6/4
  SYSTEMS RESEARCH LABS INC DAYTON OHIO
  INFORMATION HANDLING PROPERTIES OF NEUROMIME
  NETS.   (U)
DESCRIPTIVE NOTE: FINAL REPT. 15 MAY 64-31 MAY 65
     SEP 66   17P   COLOMB,ROBERT M. ;
CONTRACT: AF 33(615)-,975
PROJ: AF-7233
TASK: 723302
MONITOR: AMRL   TR-66-128

        UNCLASSIFIED REPORT

DESCRIPTORS: (*DATA PROCESSING SYSTEMS,
 *BIONICS), (*ARTIFICIAL INTELLIGENCE, PATTERN
 RECOGNITION), MATHEMATICAL MODELS, LEARNING
 MACHINES, INSTRUCTION MANUALS,
 PROGRAMMING(COMPUTERS)   (U)
IDENTIFIERS: NEUROMIME NETWORKS   (U)

  THE REPORT IS A STUDY ON SOME ELEMENTARY
  INFORMATION HANDLING PROPERTIES OF NEUROMIME NETS,
  GIVING MOST EMPHASIS TO THE FUNCTIONING OF A SINGLE
  NEUROMIME COMPONENT, AND CONTAINING SOME DISCUSSION
  OF THE OPERATION OF SIMPLE NETS. SINGLE COMPONENT
  COMPUTATION IS TREATED FROM THE POINT OF VIEW OF
  CHANGES BROUGHT ABOUT IN THE INTERNAL STRUCTURE BY
  OPERATIONS PERFORMED DURING DATA FLOW. A
  GEOMETRICAL MODEL IS PRESENTED WHICH ILLUSTRATES THE
  PATTERN MEASUREMENT BEHAVIOR OF THE COMPONENT, AND
  SOME OF THE SIMPLER DIFFERENTIAL EQUATIONS OF
  ADAPTATION ARE SOLVED TO PROVIDE SOME INSIGHT INTO
  THE EFFECT AND INTERACTION OF THE COMPONENT CONTROL
  PARAMETERS. SIMPLE NET BEHAVIOR IS CONCERNED
  MAINLY WITH FEEDBACK INTERACTION AMONG COMPONENTS,
  AND GIVES SOME USEFUL NOTATION FOR DESCRIBING NET
  OPERATION. (AUTHOR)   (U)

AD-650 132   6/1
  RAND CORP SANTA MONICA CALIF
  MATHEMATICAL ANALYSIS AND DIGITAL SIMULATION OF THE
  RESPIRATORY CONTROL SYSTEM,   (U)
      MAR 67   64P   GRODINS,FRED S. ;
  BUELL,DUANE ;BART,ALFA J. ;
REPT. NO. RM-5444-PR
CONTRACT: F44620-67-C-0045

      UNCLASSIFIED REPORT

DESCRIPTORS: (*BIOLOGY, RESPIRATORY SYSTEM),
  (*RESPIRATORY SYSTEM, MATHEMATICAL MODELS),
  LUNGS, BLOOD, TISSUES, RESPIRATORY GASES,
  TRANSPORT PROPERTIES, DIFFERENCE EQUATIONS,
  DIFFERENTIAL EQUATIONS, ACID-BASE EQUILIBRIUM,
  BLOOD CIRCULATION, CONTROL SYSTEMS,
  CHEMORECEPTORS, COMPUTER PROGRAMS, DIGITAL
  COMPUTERS, RESPONSES, CARBON DIOXIDE, HYPOXIA,
  METABOLIC DISEASES, DYNAMICS, COMPUTER LOGIC   (U)

  THE REPORT EXPRESSES THE BASIC MATERIAL BALANCE
  RELATIONSHIPS FOR THE LUNG-BLOOD-TISSUE GAS TRANSPORT
  AND EXCHANGE SYSTEM IN TERMS OF DIFFERENTIAL-
  DIFFERENCE EQUATIONS WITH A NUMBER OF DEPENDENT
  TIME DELAYS. ADDITIONAL EQUATIONS DEFINE THE
  CHEMICAL DETAILS OF TRANSPORT AND ACID-BASE
  BUFFERING, CONCENTRATIONS OF PLASMA, AND BLOOD FLOW
  BEHAVIOR. FINALLY, A CONTROL FUNCTION IS INCLUDED
  DEFINING THE DEPENDENCE OF VENTILATION UPON CSF
  (PRIMARY) AND ARTERIAL (LESSER) PO2 AT THE
  CAROTID CHEMORECEPTORS. A FORTRAN PROGRAM WAS
  WRITTEN FOR COMPREHENSIVE DIGITAL SIMULATION OF THE
  RESPONSES OF THE SYSTEM TO A WIDE VARIETY OF
  FORCINGS, INCLUDING CO2 INHALATION, HYPOXIA AT SEA
  LEVEL, ALTITUDE HYPOXIA, AND METABOLIC DISTURBANCES
  IN ACID-BASE BALANCE. BOTH DYNAMIC AND STEADY-
  STATE BEHAVIORS OF THE MODEL ARE REASONABLY
  REALISTIC. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZBO4 3

AD-650 346   5/4   6/2
  RAND CORP SANTA MONICA CALIF
  NEURONAL SPIKE TRAINS AND STOCHASTIC POINT
  PROCESSES,   (U)
DESCRIPTIVE TE: MEMORANDUM REPT.,
     MAR 67   145P   PERKEL,DONALD H. ;
  GERSTEIN,GEORGE L. ;MOORE,GEORGE P. ;
REPT, NO. RM-4816-PR
CONTRACT: F44620-67-C-0045, NSF-C21497

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN BIOPHYSICAL JOURNAL,
  V7 N4 145P (JUL 1967).
SUPPLEMENTARY NOTE: RESEARCH SUPPORTED IN PART BY
  NIH.

DESCRIPTORS: (*BIONICS, NERVOUS SYSTEM),
  (*NERVE CELLS, NERVE IMPULSES), (*NERVE
  IMPULSES, MODELS(SIMULATIONS)), MATHEMATICAL
  MODELS, STATISTICAL ANALYSIS, PHYSIOLOGY,
  BIOPHYSICS, STATISTICAL PROCESSES, STOCHASTIC
  PROCESSES, PROBABILITY, COMPUTERS, STIMULATION   (U)
IDENTIFIERS: BIOENGINEERING   (U)

  THE MATHEMATICAL THEORY OF STOCHASTIC POINT
  PROCESSES IN ITS PROBABILISTIC AND STATISTICAL
  ASPECTS IS APPLIED TO NER   IMPULSE SEQUENCES.
  MATHEMATICAL RESULTS ARE EXTENDED AND ILLUSTRATED
  THROUGH THE APPLICATION OF STATISTICAL ECHNIQUES TO
  THE RESULTS OF COMPUTER EXPERIMENTS ON SIMULATED
  NERVE CELLS. STATISTICAL TECHNIQUES AT SEVERAL
  LEVELS OF COMPLEXITY ARE USED IN THE ANALYSIS OF
  SINGLE STATIONARY SPIKE TRAINS. A SET OF
  TECHNIQUES IS PRESENTED FOR ANALYZING TWO SPIKE
  TRAINS SIMULTANEOUSLY IN THE PRESENCE AND ABSENCE OF
  STIMULATION. IT IS SHOWN HOW TO TEST FOR
  INDEPENDENCE OF THE TWO CELLS AND TO DIAGNOSE THE
  SOURCES OF DEPENDENCE WHEN FOUND. THE EFFECTS OF
  TRENDS IN THE DATA ON THE COMPUTATIONAL RESULTS ARE
  DISCUSSED AND ILLUSTRATED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-650 567   6/4
  SERVICE BUREAU CORP NEW YORK
  NEUROMIME NETWORK SIMULATOR. APPENDIX II. NEUROMIME
  SIMULATOR OUTPUT.   (U)
DESCRIPTIVE NOTE: FINAL REPT., 19 MAR 63-15 APR 66,
      SEP 66   378P   FLAUGHER,JAMES J
CONTRACT: AF 33(657)-11194
PROJ: AF-7233
TASK: 723304
MONITOR: AMRL   TR-66-101-VOL-2

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-650 576, VOLUME I.
 REPORT ON BIOLOGICAL INFORMATION HANDLING SYSTEMS
 AND THEIR FUNCTIONAL ANALOGS.

DESCRIPTORS: (*BIONICS, NERVOUS SYSTEM),
 DIGITAL COMPUTERS, SIMULATION, NERVE CELLS,
 PROGRAMMING LANGUAGES, COMPUTER PROGRAMS   (U)

  BECAUSE OF THE LARGE NUMBER OF NETWORK COMBINATIONS
  AND PARAMETER VARIATIONS POSSIBLE IN A STEELE
  NEUROMIME NETWORK, A PROGRAM FOR SIMULATING THE NETS
  ON A DIGITAL COMPUTER IS BEING DEVELOPED TO AID IN
  DETERMINING THE MOST EFFICIENT NETS FOR SPECIFIC
  TASKS. THE RESULTS OF THE INVESTIGATION OF NETWORK
  AND PARAMETER VARIATIONS MAY THEN BE USED AS THE
  RESTRAINTS AND DESIGN CRITERIA FOR NEUROMIME DEVICES
  WITH SPECIFIC SIGNAL RECOGNITION CAPABILITIES. THE
  SIMULATION PROVIDES AS A TOOL, A MEANS OF GENERATING
  RANDOMLY CONNECTED NETWORKS WITH DESIRED STATISTICAL
  RESTRAINTS AND A TRAINING PHASE WHICH ALTERS THE
  NETWORK IN SUCH A MANNER AS TO FORCE THE ACTUAL
  RESPONSE CLOSER TO THE DESIRED RESPONSE. THE
  GENERALIZED NATURE OF THE NETS USED IS THE ESSENCE OF
  THE RESEARCH EFFORT. APPENDIX II CONTAINS THE
  NEUROMIME SIMULATOR OUTPUT. (AUTHOR)   (U)

.1

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-650 576   6/4
  SERVICE BUREAU CORP NEW YORK
  NEUROMIME NETWORK SIMULATOR.   (U)
DESCRIPTIVE NOTE: FINAL REPT., 19 MAR 63-15 APR 66,
      SEP 66   137P   FLAUGHER,JAMES I
CONTRACT: AF 33(657)-11194
PROJ: AF-7233
TASK: 723304
MONITOR: AMRL   TR-66-101-VOL-1

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON PROJECT BIOLOGICAL
 INFORMATION HANDLING SYSTEMS AND THEIR FUNCTIONAL
 ANALOGS. SEE ALSO AD-650 567, VOLUME II.

DESCRIPTORS: (*BIONICS, NERVOUS SYSTEM),
 DIGITAL COMPUTERS, SIMULATION, NERVE CELLS,
 PROGRAMMING LANGUAGES, COMPUTER PROGRAMS   (U)

  BECAUSE OF THE LARGE NUMBER OF NETWORK COMBINATIONS
  AND PARAMETER VARIATIONS POSSIBLE IN A STEELE
  NEUROMIME NETWORK, A PROGRAM FOR SIMULATING THE NETS
  ON A DIGITAL COMPUTER IS BEING DEVELOPED TO AID IN
  DETERMINING THE MOST EFFICIENT NETS FOR SPECIFIC
  TASKS. THE RESULTS OF THE INVESTIGATION OF NETWORK
  AND PARAMETER VARIATIONS MAY THEN BE USED AS THE
  RESTRAINTS AND DESIGN CRITERIA FOR NEUROMIME DEVICES
  WITH SPECIFIC SIGNAL RECOGNITION CAPABILITIES. THE
  SIMULATION PROVIDES AS A TOOL, A MEANS OF GENERATING
  RANDOMLY CONNECTED NETWORKS WITH DESIRED STATISTICAL
  RESTRAINTS AND A TRAINING PHASE WHICH ALTERS THE
  NETWORK IN SUCH A MANNER AS TO FORCE THE ACTUAL
  RESPONSE CLOSER TO THE DESIRED RESPONSE. THE
  GENERALIZED NATURE OF THE NETS USED IS THE ESSENCE OF
  THE RESEARCH EFFORT. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB0463

AD-653 446   9/2   6/4
  NAVAL ORDNANCE LAB WHITE OAK MD
  COMPUTING, THINKING, AND DYNAMICS,   (U)
      DEC 66   36P   THICKSTUN,W. R. :
REPT. NO. NOLTR-67-54, MATHEMATICS DEPT-M-6E

        UNCLASSIFIED REPORT

DESCRIPTORS: (*COMPUTERS, MATHEMATICAL MODELS),
  (*BIONICS, THEORY), INFORMATION THEORY,
  REASONING, DYNAMICS, NUMERICAL METHODS AND
  PROCEDURES, ALGORITHMS   (U)

  A HEURISTIC DISCUSSION IS PRESENTED OF THE GENERAL
  PROBLEM OF COMPUTING AS IT IN FACT IS USUALLY
  PERFORMED. THE DISCUSSION HAS IMPORTANT
  IMPLICATIONS FOR THE PROCESS OF CONSTRUCTING
  MATHEMATICAL MODELS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZB04.3

AD-663 722   6/4
   AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
   ENGINEERING
   DIGITAL COMPUTER SIMULATION OF VISUAL INFORMATION
   PROCESSING IN THE HUMAN BRAIN.   (U)
DESCRIPTIVE NOTE: MASTER'S THESIS,
     JUN 67   152P   HILLSMAN,WILLIAM CLARKE :
REPT. NO. GA/EE/67-1

        UNCLASSIFIED REPORT

DESCRIPTORS: (*PATTERN RECOGNITION, DIGITAL
 COMPUTERS), (*BIONICS, *VISUAL PERCEPTION),
 SIMULATION, BRAIN, VISION, COMPUTER PROGRAMS,
 MODELS(SIMULATIONS), THESES   (U)
IDENTIFIERS: INFORMATION
 PROCESSING(PSYCHOLOGY), IBM 7094   (U)

   A VISUAL INFORMATION PROCESSING SYSTEM, BASED ON
   SELECTED ASPECTS OF HUMAN PHYSIOLOGY, IS SIMULATED ON
   THE IBM 7094 DIGITAL COMPUTER THROUGH THE USE OF
   OVER 50 TEST PATTERNS. MONOCHROMATIC TEST
   PATTERNS, REPRESENTED BY UP TO 2500 RESOLVABLE
   ELEMENTS WITHIN A 50X50 ARRAY, ARE USED TO SIMULATE
   STATIC, FOVEAL, MONOCULAR VISION. PATTERNS ARE
   COMPARED AFTER SCALING, ROTATION, AND TRANSLATION.
   THE TECHNIQUE USED FOR COMPARISON WHICH RESEMBLES
   THE WELL KNOWN CROSS-CORRELATION TECHNIQUE, IS BASED
   UPON THE ABSOLUTE-MAGNITUDE-OF-THE-DIFFERENCE OF TWO
   FUNCTIONS; AN ALGORITHM IS USED FOR SCALING AND
   ROTATION. SIMILAR AND IDENTICAL PATTERNS ARE
   IDENTIFIED BY MEANS OF EMPIRICALLY DERIVED
   DISCRIMINATION THRESHOLDS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. Z80463

AD-667 809   6/4   9/2
  AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
  OHIO
  INFORMATION PROCESSING IN SMALL SYNCODER
  NETWORKS.   (U)
DESCRIPTIVE NOTE: MASTER'S THESIS,
     SEP 67   37P   GRUENKE,ROGER ALLAN :
REPT. NO. AMRL-TR-67-104
PROJ: 7233
TASK: 723303

          UNCLASSIFIED REPORT

DESCRIPTORS: (*BIONICS, CONTROL SYSTEMS),
 (*NERVE CELLS, MODELS(SIMULATIONS)),
 NONLINEAR SYSTEMS, DATA PROCESSING SYSTEMS,
 PULSE SYSTEMS, NETWORKS, COMPUTER PROGRAMS,
 RESPONSE, THESES   (U)
IDENTIFIERS: SYNCODERS   (U)

  A SYNCODER IS AN ELECTRONIC MODEL OF SOME OF THE
  INFORMATION PROCESSING PROPERTIES OF NERVE CELLS.
  THE OPERATION OF A SINGLE SYNCODER NEAR THRESHOLD
  IS INVESTIGATED FOR TRANSIENT PULSE-PAIR INPUTS.
  THE RESULTS OBTAINED FROM THIS STIMULUS ARE
  PRESENTED IN GRAPHICAL FORM AND A NOTATION WHICH IS
  USEFUL FOR DESCRIBING NETWORK INTERCONNECTIONS IS
  PROPOSED. INVESTIGATION OF SOME OF THE ALGEBRAIC
  PROPERTIES OF SYNCODER NETWORKS SHOWS THE SYNCODING
  OPERATION NEAR THRESHOLD TO BE NONCOMMUTATIVE,
  NONASSOCIATIVE, AND NONDISTRIBUTIVE, AS WELL AS
  NONLINEAR. AN APPENDIX CONTAINS A COMPLETE CIRCUIT
  DESCRIPTION OF A SINGLE SYNCODER. (AUTHOR)   (U)

HUMAN FACTOR INFORMATION HANDLING

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NC. ZC0463

AD-262 119
  HUMAN FACTORS RESEARCH INC LOS ANGELES CALIF
  HUMAN INFORMATION TRANSMISSION AS A FUNCTION OF
  SELECTED VISUAL AND AUDITORY STIMULUS DIMENSIONS   (U)
      JUL 61   IV   BUCKNER,DONALD N.;HARABEDIAN,ALBERT
CONTRACT: NONR245300

      UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION SYSTEMS, *COMMUNICATION
 THEORY, *HUMAN ENGINEERING DATA PROCESSING SYSTEMS,
 DATA TRANSMISSION SYSTEMS, HEARING, REACTION
 (PSYCHOLOGY), SENSORY MECHANISMS, STIMULATION, TESTS,
 THRESHOLDS (PHYSIOLOGY)   (U)

AD-262 481
    AMELCO INC LOS ANGELES CALIF
    DATA PROCESSING. THE EXTENSION OF MAN'S SENSORS AND
    PHYSICAL CAPABILITIES. ANIP RESEARCH   (U)
        JUN 61   IV

        UNCLASSIFIED REPORT

DESCRIPTORS: *DATA PROCESSING SYSTEMS, *HUMAN
 ENGINEERING, COMPUTERS, DIGITAL SYSTEMS, ELECTRONICS,
 EQUATIONS, INSTRUMENTATION   (U)

    CONTENTS: DATA PROCESSING WHAT IS DATA
    PROCESSING DERIVATION OF ENERGY-INFORMATION
    RELATION THE OVER-ALL SYSTEM THE DATA
    PROCESSING SYSTEM REMARKS CONCERNING FUNCTION
    GENERATORS SYSTEM BLOCK DIAGRAM & METHODOLOGY
    FOR EVALUATING DATA PROCESSING SYSTEMS
    INFORMATION FLOW VS CLOCK RATE INFORMATION
    CHANNEL CAPACITY ANALYSIS OF SOME EXISTING
    SYSTEMS OTHER PARAMETERS MICROELECTRONICS
    SUMMARY OF MICROELECTRONICS TO DATE PHASE I--
    APPLICATION TO PRODUCTION: THE FUNCTIONAL
    ARRAY   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-283 330
  SMITH ELECTRONICS INC CLEVELAND OHIO
  DESIGN AND USE OF MAN-MACHINE SYSTEMS   (U)
                IV   MILLER,ROBERT B.;CHAPMAN,ROBERT L.;
CONTRACT: NONR-135408

        UNCLASSIFIED REPORT

DESCRIPTORS: *ARMED FORCES RESEARCH, *AUTOMATION,
 *HUMAN ENGINEERING, *MILITARY RESEARCH, ARMED FORCES
BUDGETS, COMMUNICATION THEORY, COMPUTERS, DECISION
MAKING, DEPARTMENT OF DEFENSE, DISPLAY SYSTEMS,
DOCUMENTATION, INFORMATION RETRIEVAL, LANGUAGE,
MANAGEMENT ENGINEERING, PERSONNEL, RESEARCH PROGRAM
ADMINISTRATION, SIMULATION, WEAPONS   (U)

  PROBLEMS IN BASIC RESEARCH THAT NEED TO BE SOLVED
  IN ORDER TO MAKE THE MOST EFFECTIVE USE OF MEN IN
  WEAPON SYSTEMS ARE DISCUSSED. DISCUSSION IS
  LIMITED TO TOPICS IN WHICH PRESENT RESEARCH SUPPORT
  APPEARS TO BE INADEQUATE TO MEET THE NEEDS OF THE
  DEPARTMENT OF DEFENSE IN THE TIME PERIOD 1965-
  70, AND TO THOSE TOPICS IN WHICH THE DEPARTMENT OF
  DEFENSE HAS A PECULIAR INTEREST BECAUSE OF ITS
  GENERALITY. BASIC SCIENTIFIC THEORY ON SYSTEMS
  CONSIDERED AS WHOLE IS INADEQUATE. SYSTEM
  SIMULATION TECHNIQUES ARE INADEQUATE. CURRENT
  TECHNIQUES FOR PERSONNEL OPERATIONS ARE INADEQUATE TO
  INSURE THAT NEW MAN-MACHINE SYSTEMS WILL BE
  EFFECTIVELY OPERATED, MAINTAINED AND SUPPORTED. A
  GENERALIZED MAN-TO-MACHINE CONTROL LANGUAGE IS NEEDED.
  KNOWLEDGE OF DISPLAYS IS INADEQUATE BOTH IN TERMS
  OF WHAT INFORMATION TO DISPLA AND HOW BEST TO
  DISPLAY IT. METHODS OF INDEXING RESEARCH DATA AND
  INFORMATION FOR E FICIENT USE OF MECHANIZED STORAGE
  AND RETRIEVAL SYSTEMS ARE INADEQUATE. A FOCUS IS
  NEEDED FOR THE PRESENT WIDELY SCATTERED MANMACHINE
  SYSTEM RESEARCH ACTIVITIES.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZCD463

AD-288 832
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  OBSERVING HOW HUMANS MAKE MISTAKES TO DISCOVER HOW TO
  GET COMPUTERS TO DO LIKEWISE   (U)
        JUN 62   IV   TRAVIS,L.E.;
REPT. NO. SP 776

        UNCLASSIFIED REPORT

DESCRIPTORS: *CYBERNETICS, ANALYSIS, ARTIFICIAL
  INTELLIGENCE, COMPUTERS, ERRORS, MAN, REASONING   (U)

  OBSERVING HOW HUMANS MAKE MISTAKES TO DISCOVER HOW TO GET
  COMPUTERS TO DO LIKEWISE. TECHNIQUES IN ANALYSIS OF
  PROBLEM SOLVING, WITH EXAMPLES.

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC04,3

AD-402 145
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  A STUDY IN PROBABILISTIC INFORMATION PROCESSING
  (PIP)   (U)
     APR. 63   IV   KAPLAN,RICHARD J.,NEWMAN,J.ROBERT,
REPT. NO. TM1150   00
CONTRACT: AF19 628 1649

      UNCLASSIFIED REPORT

DESCRIPTORS: *DECISION MAKING, *STATISTICAL ANALYSIS,
 COMPUTERS, DATA PROCESSING SYSTEMS, GAME THEORY, HUMAN
 ENGINEERING, PROBABILITY   (U)

 A STUDY IN PROBABILISTIC INFORMATION PROCESSING (PIP),.

AD-4,9 -18
  AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
  OHIO
  A METHODOLOGICAL APPROACH TO THE ANALYSIS AND
  AUTOMATIC HANDLING OF TASK INFORMATION FOR SYSTEMS IN
  THE C 'CEPTUAL PHASE,   (U)
     AUG   63   120P   REED,LAWRENCE E.:
  FOLEY,JOHN P.;GRAHAM,RALPH S.;
  HILGEMAN,JONATHAN B.:
PROJ: 1710
TASK: 171036
MONITOR: AMRL   TDR63 78

        UNCLASSIFIED REPORT

DESCRIPTORS: (*JOB ANALYSIS, SCIENTIFIC RE
  SEARCH), DATA PROCESSING SYSTEMS, HUMAN ENGI
  NEERING, BEHAVIOR, CODING, TRAININGRSONNEL,
  INFORMATION RETRIEVAL.   (U)
IDENTIFIERS: HUMAN FACTORS, SYSTEMS ANALYSIS,
  1963.   (U)

  ADEQUATE CONSIDERATION OF THE HUMAN SKILLS RE
  QUIRED BY FUTURE SYSTEMS HAS LONG BEEN NEGLECTED IN
  THE CONCEPTUAL PHASE OF MAN-MACHINE SYSTEM
  DEVELOPMENT. THIS NEGLECT IN PART HAS BEEN DUE TO
  LACK OF A UNIFORM AND WORKABLE METHOD FOR GATHERING,
  PROCESSING, AND USING EARLY HUMAN FAC TORS
  INFORMATION FOR IMPROVING THE DESIGN AND DEVELOPMENT
  OF SYSTEMS. THE METHODOLOGICAL APPROACH PRESENTED
  IN THIS REPORT WAS PREDICATED ON THIS NEED. THIS
  REPORT PRESENTS A TECHNIQUE FOR ANALYZING AND
  PROCESSING TASK AND TASK RE QUIREMENTS DATA GENERATED
  DURING THE CONCEPTUAL PHASE OF S 'STEM DEVELOPMENT.
  THE TECHNIQUE INCLUDES: (A) A CATEGORY SYSTEM
  FOR ORGANIZING, CLASSIFYING, AND CODING TASK
  INFORMATION. (B) A TASK ANALYSIS FORMAT FOR
  RECORDING AND CODING TASK DESCRIPTIONS AND TASK
  REQUIREMENTS; AND (C) COMPUTER UPDATE AND
  RETRIEVAL PROGRAMS. TASK REQUIREMENT DATA
  APPEARING IN DOCUMENTS RESULTING FROM THE AIR
  FORCE STUDY REQUIREMENT PROGRAM ARE ANALYZED
  AND USED FOR TESTING THE TECHNIQUE ON AN ACTUAL
  PERSONNEL TRAINING PROBLEM. THE TEST PROGRAM
  INDICATES THAT THE TECHNIQUE CAN BE USED TO ASSIST
  HUMAN FACTORS SPECIALISTS TO ISOLATE AND PROCESS TASK
  AND TASK REQUIREMENTS ASSOCIATED WITH ADVANCED
  SYSTEMS FOR MAKING PERSONNEL, TRAIN ING, AND TRAINING
  EQUIPMENT RECOMMENDATIONS. (AUTHOR)   (U)
                        52

AD-424 284
  BOLT BERANEK AND NEWMAN INC CAMBRIDGE MASS
  THE SYSTEM SYSTEM AND BRIDGES OVER THE GULF BETWEEN
  MAN-MACHINE-SYSTEM RESEARCH AND MAN-MACHINE-SYSTEM
  DEVELOPMENT,   (U)
      JAN 62   30P   LICKLIDER,J. C. R. :
CONTRACT: AF49 638 355
MONITOR: AFOSR   1673

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*OPERATIONS RESEARCH, COMPUTERS),
 (*HUMAN ENGINEERING, DESIGN), COMPUTERS, SCIENTIFIC
 RESEARCH, COMMUNICATION THEORY, MODELS (SIMULATIONS),
 OPERATION, MATHEMATICAL MODELS   (U)
IDENTIFIERS: 1962, MAN-MACHINE SYSTEM, SYSTEM
 ANALYSIS. PERT, SAGE, TIROS, MIDAS   (U)

  THE NEED FOR GREATER COHERENCE IN THE MANMACHINE
  AND OTHER HIGH-ORDER INTERACTIONS OF OUR MAJOR
  SYSTEMS IS DESCRIBED, AND AN APPROACH TO ACHIEVEMENT
  OF THAT COHERENCE IS PROPOSED. THE APPROACH
  INVOLVES A COMPUTER-CENTERED META-SYSTEM (THE
  'SYSTEM SYSTEM') DESIGNED TO FACILITATE
  COMMUNICATION, COORDINATION, AND PROBLEM-SOLVING.
  THE NEEDS FOR, AND ROLES OF, SUCH A META-SYSTEM IN
  VARIOUS PHASES OF SYSTEM DESIGN, DEVELOPMENT,
  PRODUCTION, AND OPERATION ARE DISCUSSED.
  (AUTHOR)   (U)

AD-430 412
  MASSACHUSETTS UNIV AMHERST
  INFORMATION PROCESSING UNDER TASK STRESS.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
      NOV 63   54P   TEICHNER,WARREN H. :
CONTRACT: AF19 628 290
PROJ: 7682
TASK: 768201
MONITOR: ESD   TDR63 657

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON MAN COMPUTER
  INFORMATION PROCESSING.

DESCRIPTORS: (*DATA PROCESSING SYSTEMS, MANNED),
 (*PERSONNEL MANAGEMENT, DATA PROCESSING SYSTEMS:,
 (*JOB ANALYSIS, DATA PROCESSING SYSTEMS), OPERATION,
 INPUT-OUTPUT DEVICES, OPERATOR (PERSONNEL), STRESS
 (PSYCHOLOGY), MEMORY, ANALYSIS OF VARIANCE,
 EXPERIMENTAL DATA, TABLES, DATA, COMMUNICATION THEORY(U)
IDENTIFIERS: INFORMATIONAL INPUT, SUBJECTIVE
 INFORMATION, HUMAN INFORMATION PROCESSING, SYSTEM
 VARIABLES   (U)

  THIS IS THE FINAL REPORT OF STUDIES OF HUMAN
  INFORMATION PROCESSING RELATED TO VARIABLES PRESENT
  IN HIGH SPEED SYSTEMS OPERATIONS. THIS REPORT
  REVIEWS EARLIER REPORTED DATA PERTINENT TO THE
  EFFECTS OF INFORMATIONAL INPUT RATES AND RELATED
  FACTORS. THE REPORT THEN PRESENTS EXPERIMENTS
  CONCERNED WITH TWO OTHER ASPECTS OF THE PROBLEM:
  (1) THE INTERACTION OF SHORT-AND LONG-TERM
  MEMORIES IN HUMAN DATA HANDLING, AND (2) THE
  EFFECTS OF PRESENTED INFORMATION RATES ON SUBJECTIVE
  INFORMATION, I.E., THE AMOUNT OF INFORMATION IN THE
  OPERATOR'S ESTIMATE OF WHAT IS PRESENTED BY THE
  DISPLAY. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0443

AD-483 974   5/9
  UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ELECTRONICS
  PERSONNEL RESEARCH GROUP
  POTENTIAL USES OF COMPUTERS AS TEACHING
  MACHINES,   (U)
     OCT 61   26P   RIGNEY,JOSEPH W. :

        UNCLASSIFIED REPORT

DESCRIPTORS: (•DIGITAL COMPUTERS, TEACHING
 MACHINES), FEASIBILITY STUDIES, HUMAN
 ENGINEERING, PERFORMANCE(HUMAN), MAN-MACHINE
 SYSTEMS, ACHIEVEMENT TESTS, APPLIED PSYCHOLOGY,
 EDUCATION   (U)

  THE USE OF INTERACTIVE CAPACITY TO DEAL WITH
  INDIVIDUAL DIFFERENCES IN LEARNING HAS POTENTIALITIES
  IN AT LEAST THREE TYPES OF LEARNING ENVIRONMENTS.
  HOWEVER, ITS APPLICATION TO THIS PROBLEM IN ANY OF
  THESE ENVIRONMENTS IS IN RELATIVELY CRUDE STAGES.
  ALTHOUGH NOT TECHNOLOGICALLY IMPOSSIBLE TO
  IMPLEMENT, DEVELOPING MAN-COMPUTER INTERACTIONS WHICH
  WILL ADJUST THE PRESENTATION OF THE MATERIAL TO BE
  LEARNED TO INDIVIDUAL CAPABILITIES AND REQUIREMENTS
  DEPENDS UPON A SUITABLE BACKGROUND OF PSYCHOLOGICAL
  INFORMATION FOR GUIDANCE. AT THE PRESENT TIME,
  THERE APPEARS TO BE A GREAT DEAL OF THIS INFORMATION
  THAT IS SUGGESTIVE OF DIRECTIONS TO TAKE, AND OF
  PROBLEMS THAT WILL ARISE. HOWEVER, IT IS LIKELY
  THAT INVESTIGATORS TRYING TO USE THIS NEW TOOL FOR
  THIS PURPOSE WILL HAVE TO DEVELOP THEIR OWN SPECIFIC
  METHODOLOGY AND THEIR OWN FUND OF RESEARCH EXPERIENCE
  WITHIN THE BROADER CONTEXT OF TRADITIONAL STUDIES OF
  INDIVIDUAL DIFFERENCES IN LEARNING.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-486 382   5/5
  NEW YORK UNIV N Y DEPT OF INDUSTRIAL ENGINEERING AND
  OPERATIONS RESEARCH
  FACTORS AFFECTING INFORMATION STORAGE AND RETRIEVAL
  IN MAN.   (U)
DESCRIPTIVE NOTE: FINAL REPT. SEP 63-JUN 66,
      JUN 66   19P   MAYZNER,MARK S. :
CONTRACT: NONR-285(56)
PROJ: NR-196-027

        UNCLASSIFIED REPO T

DESCRIPTORS: (*DATA STORAGE SYSTEMS, HUMAN
 ENGINEERING), (*INFORMATION RETRIEVAL, HUMAN
 ENGINEERING), HUMANS, DECISION MAKING, COMMAND
 * CONTROL SYSTEMS, DATA PROCESSING SYSTEMS,
 OPERATORS(PERSONNEL), DESIGN, DISPLAY SYSTEMS,
 CODING, RECALL, PERFORMANCE(HUMAN),
 MATHEMATICAL MODELS, RETENTION, INPUT-OUTPUT
 DEVICES   (U)

  THIS FINAL EPO. . DISCUSSES IN SOME DETAIL THE
  MAJOR RESULTS OF SOME 14 STUDIES THAT EXAMINED THE
  EFFECTS OF FOUR PARAMETERS NAMELY, (1) CODING
  OF INFORMATION, (2) ORGANIZATION OF
  INFORMATION, (3) AMOUNT OF INFORMATION, AND
  (4) DISPLAY TIME, ON INORMATION STORAGE AND
  RETRIEVAL CAPACITY IN MAN. FIVE STUDIES DEALT
  SPECIFICALLY WITH CODING, THREE STUDIES DEALT
  SPECIFICALLY WITH ORGANIZATION, TWO STUDIES DEALT
  SPECIFICALLY WITH AMOUNT, AND FOUR STUDIES DEALT
  SPECIFICALLY WITH DISPLAY TIME. THE RESULTS OF ALL
  14 STUDIES WERE RELATED TO A VARIETY OF DISPLAY
  DESIGN PROBLEMS IN MILITARY *COMMAND AND CONTROL*
  SYSTEMS AND A NUMBER OF SPECIFIC DISPLAY DESIGN
  RECOMMENDATIONS ARE OFFERED BASED ON THE RESEARCH
  FINDINGS.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC04A3

AD-601 075
  RAND CORP SANTA MONICA CALIF
  COMPUTER SIMULATION OF HUMAN BEHAVIOR   (U)
      MAY 64   15P   FEIGENBAUM,E. A. I
REPT. NO. 2905

            UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*BEHAVIOR, SIMULATION), *DIGITAL
 COMPUTERS, HUMANS, LEARNING, COMPUTER LOGIC,
 PROGRAMMING LANGUAGES, PROGRAMMING (COMPUTERS), MODELS
 (SIMULATIONS), VERBAL BEHAVIOR   .U)

  BASED ON A SURVEY OF THE LITERATURE, THE DIGITAL
  COMPUTER AS A SIMULATOR OF HUMAN BEHAVIOR IS
  DISCUSSED UNDER THE FOLLOWING TOPICS: (1)
  COMPUTERS AS INFORMATION PROCESSORS, (2)
  HUMAN INFORMATION PROCESSING, (3) INFORMATION
  PROCESSING THEORY AND COMPUTER SIMULATION, (4)
  COMPUTER SIMULATION WITHIN EXISTING FRAMEWORKS,
  (5) NEW INFORMATION PROCESSING MODELS.   (U)

AD-602 041
  BIO-DYNAMICS INC CAMBRIDGE MASS
  DESIGN AND USE OF INFO ATION SYSTEMS FOR AUTOMATED
  ON-THE-JOB TRAINING, I CONCEPTUAL AND EXPERIMENTAL
  APPROACHES,   (U)
      DEC 63   105P   SHERIDAN,THOMAS B. :
  MAYER,SYLVIA R. :
CONTRACT: AF19 629 455
PROJ: 7682
TASK: 768204
MONITOR: ESD   TDR64 234

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMAND AND CONTROL SYSTEMS, TRAINING
 DEVICES), (*TRAINING DEVICES), BEHAVIOR, DECISION
 MAKING, TRAINING, LEARNING, EDUCATION, DISPLAY
 SYSTEMS, COMPUTERS, MODELS (SIMULATIONS), LANGUAGE,
 GAME THEORY, JOB ANALYSIS, AUTOMATION, DESIGN   (U)
IDENTIFIERS: SAGE   (U)

  THE REPORT DESCRIBES EXPLORATORY DEVELOPMENTS ON
  LABORATORY MODELS OF AUTOMATED TRAINING SUBSYSTEMS
  FOR INFORMATION SYSTEMS. SUCH SUBSYSTEMS COULD
  PROVIDE FUTURE INFORMATION SYSTEMS WITH THE
  CAPABILITY TO TRAIN THEIR USERS ON-THE JOB. THE
  REPORT OUTLINES ON-GOING STUDIES CONCERNED WITH
  (1) THE UNIQUE TRAINING REQUIREMENTS IN ADVANCED
  INFORMATION SYSTEMS: (2) NEW TRAINING CONCEPTS
  AND TECHNIQUES TO MEET THESE REQUIREMENTS: AND
  (3) AN ANALYTIC TOOL TO DESCRIBE FUNCTIONAL AND
  STRUCTURAL OVERLAP OF EQUIPMENT REQUIRED FOR BOTH
  OPERATIONS AND TRAINING. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-602 042
  BIO-DYNAMICS INC CAMBRIDGE MASS
  DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED
  ON-THE-JOB TRAINING. II. DESIGN OF SELF-
  INSTRUCTIONAL FEATURES.   (U)
      JAN 64   34P   SHERIDAN,THOMAS B. ;
  DUGGAR,BENJAMIN C. ;MAYER,SYLVIA R. ;
CONTRACT: AF19 628 455
PROJ: 7682
TASK: 768204
MONITOR: ESD   TDR64 234

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMAND AND CONTROL SYSTEMS, TRAINING
 DEVICES), (*TRAINING DEVICES, TEACHING MACHINES),
 BEHAVIOR, HUMAN ENGINEERING, CODING, PROGRAMMING
 (COMPUTERS), DECISION MAKING, TRAINING, LEARNING,
 EDUCATION, COMPUTERS, LANGUAGE, AUTOMATION, MODELS
 (SIMULATIONS), DESIGN   (U)
IDENTIFIERS: SAGE   (U)

  THE REPORT IS CONCERNED WITH HUMAN ENGINEERING
  FACTORS IN THE DESIGN OF INFORMATION SYSTEMS. IN
  PARTICULAR IT IS ADDRESSED TO THE DESIGN OF SELF-
  INSTRUCTIONAL FEATURES FOR THESE SYSTEMS. IT
  DESCRIBES THEORIES, METHODOLOGY, AND DESIGN
  PRINCIPLES FOR IMPLEMENTATION OF SELF-INSTRUCTIONAL
  FEATURES. THE DESIGN PRINCIPLES WERE INDUCED FROM
  THE EXPLORATORY RESEARCH ON LABORATORY MODELS OF
  INFORMATION SYSTEMS WHICH IS REPORTED IN VOLUME I
  OF THIS SERIES (AD-602 041), FROM STUDIES ON
  CURRENT INFORMATION SYSTEMS, AND FROM A LITERATURE
  REVIEW. THE OPERATIONAL CONCEPTS UNDERLYING THE
  STUDY ARE STATED, AND AN EQUIPMENT DESIGN PHILOSOPHY
  IS PROPOSED TO COMPLEMENT THIS OPERATIONAL CONCEPT.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZCD463

AD-605 387
  INSTITUTE OF ENVIRONMENTAL PSYCHOPHYSIOLOGY UNIV OF
  MASSACHUSETTS AMHERST
  THE EFFECT OF VARIOUS MODES OF REHEARSAL ON SHORT-
  TERM RECALL.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     JUN 64   8P   LEWIS,MARY ELEANOR :
  TEICHNER,WARREN H. :
CONTRACT: N61339 1303
MONITOR: NAVTRADEVCEN ,   1303 1

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TWO OTHER STUDIES PERFORMED UNDER THIS
  CONTRACT ARE 1303-2 AND 1303-3, DATED 11 JUN 64.

DESCRIPTORS: (*RECALL, PERFORMANCE TESTS), (*DECISION
  MAKING, RECALL), PERFORMANCE (HUMAN), STRESS
  (*PSYCHOLOGY), VISION, AFTER-IMAGES, MEMORY, CHARACTER
  RECOGNITION, RETENTION, LEARNING, AUDITORY SIGNALS,
  VISUAL SIGNALS, RADAR OPERATORS, SYSTEMS ENGINEERING,
  WEAPON SYSTEMS, PSYCHOPHYSIOLOGY, PSYCHOMETRICS   (U)
IDENTIFIERS: REHEARSAL, MAN-MACHINE SYSTEMS   (U)

  AS PART OF A PROGRAM OF STUDY DIRECTED TO IMPROVING
  HUMAN DATA RECEPTION, PROCESSING AND STORAGE, THIS
  ACTIVITY SPONSORED EXPERIMENTAL RESEARCH TO
  INVESTIGATE THREE VARIABLES: THE STRATEGIES
  EMPLOYED BY HUMAN SUBJECTS; THE ORGANIZATION OF THE
  INFORMATION BEING COMMUNICATED; AND THE
  CHARACTERISTICS OF THE DISPLAY ITSELF. THIS REPORT
  DEALS WITH THE HUMAN OPERATION OF REHEARSING BRIEFLY-
  PERCEIVED ALPHA-NUMERIC MATERIAL. THE RESULTS
  SUPPORT THE CONCLUSION THAT, UNDER CERTAIN CONDITIONS
  OF TASK STRESS, APPROPRIATE REHEARSAL CAN IMPROVE
  THAT HUMAN PERFORMANCE WHICH IS A FUNCTION OF
  SHORTTERM MEMORY AND, THUS, IN A MAN-MACHINE
  RELATIONSHIP, IMPROVE SYSTEM PERFORMANCE.
  SUGGESTED EXAMPLES ARE GIVEN OF THE APPLICATION OF
  THE FINDINGS WITHIN A MILITARY CONTEXT, E.G., RADAR-
  SCOPE MONITORING WITHIN A COMBAT INFORMATION
  CENTER (CIC).   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. Z(3*A)

AD-605 928
  PHILCO CORP PALO ALTO CALIF
  A HUMAN ENGINEERING EVALUATION OF SOME
  SELFILLUMINATED IN-LINE DIGITAL DISPLAYS,   (U)
      JUL   61   IV   SHOENBERGER,L. ;
REPT. NO. WDL-TR1587
CONTRACT: AFO4 647 532

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HUMAN ENGINEERING, DISPLAY SYSTEMS),
 (*DISPLAY SYSTEMS, HUMAN ENGINEERING), CHARACTER
 RECOGNITION, REACTION (PSYCHOLOGY), REFLEXES,
 PERFORMANCE TESTS, MONITORS, ANALYSIS OF VARIANCE,
 COMMUNICATION SYSTEMS, CONTROL SYSTEMS, DIGITAL
 SYSTEMS, VISUAL SIGNALS   (U)

  THIS REPORT DESCRIBES AN EVALUATION OF SIX IN-LINE
  SELFILLUMINATED DIGITAL DISPLAYS. BASED ON
  READABILITY, THE EVALUATION COVERS A RANGE OF 117
  VIEWING CONDITIONS OF THE DISPLAYS. THE NUMBER OF
  CORRECT RESPONSES THAT FOUR OBSERVERS MADE TO EACH
  DISPLAY WAS SUBJECTED TO AN ANALYSIS OF VARIANCE AND
  TESTS OF SIGNIFICANCE. THE CONCLUSION OF THE
  EXPERIMENT WAS THAT A CHARACTER PROJECTION DEVICE WAS
  SUPERIOR TO THE OTHER DISPLAYS OVER ALL VIEWING
  CONDITIONS, TAKEN AS A WHOLE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 4C0463

AD-608 367
   RAND CORP SANTA MONICA CALIF
   THE LOGIC OF INTERROGATING A DIGITAL COMPUTER,   (U)
       NOV 64   24P   MARON,M. E. ;
REPT. NO. P-3006

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE 1964 LINGUISTIC
 INSTITUTE OF THE LINGUISTIC SOCIETY OF AMERICA,
 UNIV. OF INDIANA, BLOOMINGTON.

DESCRIPTORS: (*DIGITAL COMPUTERS, COMPUTER LOGIC),
 (*COMPUTER LOGIC, DIGITAL COMPUTERS), LANGUAGE,
 ARTIFICIAL INTELLIGENCE, CYBERNETICS, COMMUNICATION
 THEORY, INFORMATION RETRIEVAL, PROBABILITY,
 MATHEMATICAL LOGIC   (U)

   THE TOPICS DISCUSSED IN THIS PAPER ARE (1) THE
   INFORMATION SCIENCES, (2) INTERROGATING A DIGITAL
   COMPUTER, (3) DATA RETRIEVAL SYSTEMS: AND (4)
   CYBERNETICS, MEANING, AND COMPREHENSION.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-609 486
  UTAH UNIV SALT LAKE CITY
  INFORMATION AND SCIENTIFIC CREATIVITY,   (U)
       JUN 64   20P   TAYLOR,CALVIN W. I
CONTRACT: AF AFOSR144 63
MONITOR: AFOSR ,   64 2502

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PAPER PRESENTED AT THE SECOND
 SYMPOSIUM OF THE FEDERAL COUNCIL FOR SCIENCE AND
 TECHNOLOGY, 13 APR 64, ON THE TOPIC, 'TECHNICAL
 INFORMATION AND THE FEDERAL LABORATORY.'

DESCRIPTORS: (*SCIENTIFIC PERSONNEL, PERFORMANCE
 (HUMAN)), (*INFORMATION RETRIEVAL, SCIENTIFIC
 PERSONNEL), HUMAN ENGINEERING, SUPERVISORY PERSONNEL,
 SYMPOSIA, INTELLIGENCE TESTS, LEARNING, MEMORY,
 REASONING, INDUSTRIAL PSYCHOLOGY   (U)
IDENTIFIERS: CREATIVE THINKING   (U)

   IN THIS PAPER THE PROBLEM OF STUDYING WHAT
   CONSTITUTES EFFECTIVENESS AND CREATIVITY IN A
   SCIENTIST IS DISCUSSED. THE WAY THE SCIENTIST
   RECEIVES AND HANDLES INFORMATION, THE INTELLECTUAL
   CLIMATE IN WHICH HE WORKS, AND THE NATURE OF THE
   INFORMATION RECEIVED BY HIM ARE ALL EXAMINED IN THEIR
   BEARING ON THE CREATIVE PROCESS.   (U)

AD-609 749
   MASSACHUSETTS INST OF TECH CAMBRIDGE ENGINEERING PROJECTS
   LAB
   HUMAN USE OF SHORT TERM MEMORY IN PROCESSING
   INFORMATION ON A CONSOLE,   (U)
      SEP 64   49P   ZEIGLER,BERNARD P. :
   SHERIDAN,THOMAS B. :
REPT. NO. DSR-9960-1
CONTRACT: AF19 628 3317
PROJ: 7682
TASK: 768204
MONITOR: ESD ,   TDR64 620

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER PERSONNEL, MEMORY),
 (*COMPUTER STORAGE DEVICES, HUMAN ENGINEERING),
 DECISION MAKING, COMPUTERS, INFORMATION RETRIEVAL,
 DATA PROCESSING SYSTEMS, DATA STORAGE SYSTEMS,
 COMMUNICATION THEORY, LEARNING   (U)
IDENTIFIERS: MAN-MACHINE SYSTEMS   (U)

   THE REPORT ASSUMES THAT AN OPERATOR'S CONSOLE
   CONSTITUTES A THIRD FORM OF MEMORY IN ADDITION TO
   THAT INTEGRAL TO THE HUMAN AND THAT INTEGRAL TO THE
   MACHINE WHICH IS NOT DIRECTLY ACCESSIBLE TO THE
   HUMAN. QUESTIONS ARE RAISED CONCERNING THE
   CHARACTERISTIC MODES OF HUMAN STORAGE AND RETRIEVAL
   OF INFORMATION FROM INTERNAL MEMORY WHEN SUCH
   EXTERNAL MEMORY IS ACCESSIBLE. THE REPORT ALSO
   INTRODUCES THE CONCEPT OF ASSOCIATIVE MEMORY NETS
   FORMED BY CURRELATED IMAGES OF EXTERNAL EVENTS. A
   LIST PROCESSING EXPERIMENT IS DESCRIBED. STORAGE
   STRUCTURES CHARACTERIZING INTERNAL HUMAN MEMORY AND
   EXTERNAL CONSOLE MEMORY IN THIS TASK ARE POSTULATED.
   A RETRIEVAL MODE IMPLIED BY THESE STURCTURES IS
   CONSTRUCTED TO ACCOUNT FOR THE EFFECTS OF COMPUTATION
   AND LEARNING UPON THE FEATURES OF THE EXPERIMENTALLY
   OBTAINED CURVES. INSUFFICIENT RETRIEVAL OF
   REQUIRED INFORMATION FROM INTERNAL MEMORY IS ASSUMED
   TO NECESSITATE EXTERNAL MEMORY SEARCH. THE EFFECT
   OF COMPUTATION IS TO INCREASE THE PROBABILITY OF
   INSUFFICIENT RETRIEVAL AND HENCE THE FREQUENCY OF
   EXTERNAL SEARCH. LEARNING DECREASES THIS
   PROBABILITY. THE EFFECTS OF INDUCING ALTERNATE
   FORMS OF INTERNAL STORAGE ARE STUDIED AND FOUND
   GENERALLY TO RESULT IN INCREASED STORAGE AND
   RETRIEVAL TIMES. IMPLICATIONS FOR CONSOLE DESIGN
   ARE DISCUSSED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-614 229
  PENNSYLVANIA UNIV PHILADELPHIA MOORE SCHOOL OF
  ELECTRICAL ENGINEERING
  THE EVALUATION OF TECHNIQUES AND DEVICES AS APPLIED
  TO PROBLEM SOLVING.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
     FEB 65   113P   RUBINOFF,MORRIS ;WHITE,J. F.
  ,JR.;LOEV,DAVID ;BLUMBERG,DONALD F. ;
CONTRACT: AF30 602 3065
PROJ: 4594
TASK: 459404
MONITOR: RADC ,   TDR-64-402

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*ARTIFICIAL INTELLIGENCE, DECISION
 MAKING), (*DECISION MAKING, HUMANS), COMPUTERS,
 PERFORMANCE (HUMAN), GAME THEORY, INFORMATION
 RETRIEVAL, MATHEMATICAL MODELS, LEARNING, GROUP
 DYNAMICS, PERSONALITY, PROBABILITY   (U)
IDENTIFIERS: PROBLEM SOLVING, PREDICTION, CREATIVE
 THINKING   (U)

  THE PROBLEM OF FORECASTING TECHNOLOGICAL CHANGE IS
  INVESTIGATED. MACHINES AND COMPUTER PROGRAMS
  HAVING 'PROBLEM SOLVING' CAPABILITIES ARE EXAMINED TO
  DETERMINE THEIR USEFULNESS IN AIDING OR REPLACING THE
  HUMAN FORECASTER. THE LITERATURE ON HUMAN PROBLEM
  SOLVING WAS ALSO REVIEWED. THE FOLLOWING
  CONCLUSIONS WERE REACHED: (1) THE NATURE OF THE
  FORECASTING PROBLEM PRECLUDES THE USE OF COMPUTER-
  TYPE PROBLEM SOLVERS DEVELOPED TO DATE, AND (2)
  THE APPLICATION OF INFORMATION SCIENCE TECHNIQUES,
  NAMELY: DESCRIPTORS REPRESENTING TECHNOLOGICAL
  CONCEPTS, THE FORCES ACTING TO CHANGE THE TECHNOLOGY
  AND THE LAWS GOVERNING THE CHANGE, APPEAR TO OFFER
  THE MOST PROMISE IN ASSISTING THE HUMAN FORECASTER.
  ACCORDINGLY, A QUASIMATHEMATICAL MODEL WAS
  DEVELOPED USING MATRIX NOTATION TO DESCRIBE A
  TECHNOLOGY. AN EXAMPLE OF A FORECAST OF COMPUTER
  TECHNOLOGY MADE SEVERAL YEARS AGO IS INCLUDED.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZCO463

AD-616 544
  BIO-DYNAMICS INC CAMBRIDGE MASS
  DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED
  ON-THE-JOB TRAINING. VOLUME III. EXPERIMENTAL USE OF
  THREE INSTRUCTIONAL CONCEPTS.   (U)
      MAR 65   84P   SHERIDAN,THOMAS B. :
CONTRACT: AF19 628 455
PROJ: 7682
TASK: 768204
MONITOR: ESD .   TDR-64-234 V3

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-602 041, AD-602 042.

DESCRIPTORS: (*TRAINING DEVICES, COMMAND +
 CONTROL SYSTEMS), (*COMMAND + CONTROL SYSTEMS,
 TRAINING DEVICES), DESIGN, AUTOMATION,
 TEACHING MACHINES, COMPUTERS, BEHAVIOR, GAME
 THEORY, PERFORMANCE(HUMAN), PERFORMANCE TESTS,
 DISPLAY SYSTEMS, CONTROL PANELS, ERRORS,
 DECISION MAKING, HUMAN ENGINEERING, AIR FORCE
 PERSONNEL   (U)
IDENTIFIERS: ON-THE-JOB TRAINING, MAN-MACHINE
 SYSTEMS   (U)

  THE REPORT DESCRIBES THREE EXPERIMENTS IN WHICH
  NOVEL TEACHING CONCEPTS WERE DEMONSTRATED. THESE
  CONCEPTS HAD BEEN PROPOSED IN PREVIOUS REPORTS BUT
  THEIR EFFECTIVENESS REMAINED TO BE VERIFIED
  EXPERIMENTALLY. THE RESULTS WERE: (1) A
  TEACHING PROGRAM ORDERED ACCORDING TO THE DISCOVERY
  PRINCIPLE SIGNIFICANTLY REDUCED ERRORS AND
  PERFORMANCE TIME OVER THAT OBSERVED AFTER TRAINING
  WITH A CONVENTIONAL TRAINING MANUAL. (2) SLIDES
  PROJECTED DIRECTLY ONTO A CONTROL CONSOLE, TOGETHER
  WITH A TAPED LECTURE, WERE FOUND TO BE AN EFFECTIVE
  METHOD OF PRESENTING AN AUTOMATED TRAINING PROGRAM.
  (3) GRAPHICAL LOGICAL FLOW DIAGRAMS WERE FOUND TO
  BE EFFICIENT INSTRUCTIONS FOR TEACHING PROCEDURES FOR
  PERFORMING A QUERYING-REASONING TASK. IT WAS
  CONCLUDED THAT THESE CONCEPTS SHOULD BE EXPLOITED IN
  TRAINING PROGRAMS FOR OPERATORS OF AIR FORCE
  INFORMATION SYSTEMS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-616 545
  BIO-DYNAMICS INC CAMBRIDGE MASS
  DESIGN AND USE OF INFORMATION SYSTEMS FOR AUTOMATED
  ON-THE-JOB TRAINING, VOLUME V.   (U)
DESCRIPTIVE NOTE: FINAL RFPT. FOR 1962-1964,
     APR 65   22P   SHERIDAN,THOMAS B. ;
CONTRACT: AF19 628 455
PROJ: 7682
TASK: 768204
MONITOR: ESD ,   TDR-64-234 V5

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-616 551.

DESCRIPTORS: (*COMMAND + CONTROL SYSTEMS,
 TRAINING DEVICES), (*TRAINING DEVICES, COMMAND
 + CONTROL SYSTEMS), DESIGN,
 MODELS(SIMULATIONS), COMPUTERS, AUTOMATION,
 PROGRAMMING(COMPUTERS), DECISION MAKING,
 DISPLAY SYSTEMS, TEACHING MACHINES   (U)
IDENTIFIERS: FLOW CHARTS, MAN-MACHINE SYSTEMS,
 ON-THE-JOB TRAINING   (U)

  THE REPORT DESCRIBES THE RESULTS AND CONCLUSIONS OF
  A STUDY WHICH WAS DIRECTED AT THE DEVELOPMENT OF
  PRINCIPLES FOR THE DESIGN OF AUTOMATED INSTRUCTIONAL
  SUBSYSTEMS FOR INFORMATION SYSTEMS. A SERIES
  OF FOUR TECHNICAL DOCUMENTARY REPORTS HAVE BEEN
  ISSUED WHICH DESCRIBE IN DETAIL THE ACTIVITIES AND
  RESULTS OF EACH ASPECT OF THE STUDY. THIS REPORT
  BRINGS TOGETHER AND SUMMARIZES THE RESULTS REPORTED
  IN THE INDIVIDUAL DOCUMENTS, AND INCLUDES ADDITIONAL
  ITEMS WHICH DID NOT WARRANT SEPARATE DOCUMENTATION.
  (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-616 551
  BIO-DYNAMICS INC CAMBRIDGE MASS
  DESIGN AND USE OF INFOR .TION SYSTEMS FOR AUTOMATED
  ON-THE-JOB TRAINING. VOLUME IV. GRAPHICAL SYMBOLOGY
  AND LOGIC DIAGRAMS FOR USE AS TRAINING AIDS,   (U)
      JAN 65   43P   DUGGAR,BENJAMIN C. :
  ROSENBERG,RONALD C. :SHERIDAN,THOMAS B. :
  MAYER,SYLVIA R. :
CONTRACT: AF19 628 455
PROJ: 7682
TASK: 68204
MONITOR: ESD ,   TDR-64-234 V4

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-616 544.

DESCRIPTORS: (*COMMAND + CONTROL SYSTEMS,
 TRAINING DEVICES), (*TRAINING DEVICES,
 GRAPHICS), COMPUTERS, PROGRAMMING(COMPUTERS),
 COMPUTER LOGIC, LANGUAGE, BEHAVIOR, DECISION
 MAKING, INSTRUCTION MANUALS, CONTROL PANELS,
 TEACHING MACHINES   (U)
IDENTIFIERS: FLOW CHARTS, MAN-MACHINE SYSTEMS,
 ON-THE-JOB TRAINING   (U)

  THE REPORT DESCRIBES THE RESULTS OF A STUDY TO
  DEVELOP A GRAPHICAL SYMBOLOGY AND LOGIC DIAGRAMING
  TECHNIQUE FOR USE AS A TRAINING AID. THIS WORK IS
  ADDRESSED TO THE NEED FOR A LANGUAGE WHICH DESCRIBES
  THE LOGICAL RELATIONSHIPS AMONG TASK COMPONENTS AND
  THE INTERACTIONS BETWEEN MAN AND MACHINE IN ADVANCED
  COMPUTER-BASED INFORMATION SYSTEMS. SYMBOLS AND A
  LOGIC DIAGRAMING TECHNIQUE WERE DEVELOPED AND REFINED
  BY UTILIZATION WITH SEVERAL DIFFERENT TYPES OF TASKS.
  THIS 'LANGUAGE' HAS BEEN FOUND TO BE USEFUL FOR THE
  FOLLOWING PURPOSES: (A) TO SUPPLEMENT WRITTEN
  INSTRUCTION MANUALS, (B) AS AN INSTRUCTIONAL TOOL
  WITHOUT TEXT, AND (C) AS A PERFORMANCE AID WHEN
  DISPLAYED DIRECTLY ON AN OPERATIONAL CONSOLE. A
  STEP-BY-STEP METHODOLOGY FOR CONSTRUCTING LOGIC FLOW
  DIAGRAMS IS PRESENTED, AND APPLICATIONS ARE
  DISCUSSED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-623 619
  AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
  OHIO
  APPLICATION OF BEHAVIORAL SCIENCE TO PERFORMANCE AID
  DEVELOPMENT.   (U)
DESCRIPTIVE NOTE: STATE-OF-THE-ART REPT.,
     AUG 65   20P   TOPMILLER,DONALD A. I
REPT. NO. AMRL-TR-65-146
PROJ: 7184
TASK: 718406

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HUMAN ENGINEERING, DISPLAY
 SYSTEMS), (*DATA PROCESSING SYSTEMS, HUMAN
 ENGINEERING), (*INSTRUCTION MANUALS, HUMAN
 ENGINEERING), NUMBERS, MAINTENANCE,
 MAINTAINABILITY, MALFUNCTIONS, AIR FORCE
 EQUIPMENT, SPECIFICATIONS, SYSTEMS ENGINEERING,
 CHECKOUT PROCEDURES, SIMULATION, DESIGN   (U)

  FOUR CLASSES OF VARIABLES RELEVANT TO BEHAVIORAL
  RESEARCH ON THE DEVELOPMENT OF PERFORMANCE AIDS
  (TECHNICAL ORDERS, MAINTENANCE MANUALS, ETC.) ARE
  OUTLINED: (A) LEGIBILITY AND FORMAT
  VARIABLES; (B) VARIABLES ASSOCIATED WITH
  PROCESSING PRINTED NUMERIC INFORMATION;
  (C) VARIABLES ASSOCIATED WITH THE PHYSICAL
  CONFIGURATION OF PERFORMANCE AIDS; AND, (D)
  VARIABLES ASSOCIATED WITH TROUBLESHOOTING
  INFORMATIONAL PROCESSING AND DISPLAY SYSTEMS.
  EACH OF THESE TOPICS IS DISCUSSED WITHIN A
  HISTORICAL FRAMEWORK, WITH SUPPORTING EMPIRICAL
  RESEARCH. SOME PREDICTIONS ARE MADE FOR FUTURE
  TRENDS IN PERFORMANCE-AID BEHAVIORAL STUDIES.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZCO463

AD-628 206   5/2   5/5
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  HUMAN ENGINEERING THE GPDS/LUCID SYSTEM:
  CONSIDERATIONS AND PLANS.   (U)
DESCRIPTIVE NOTE: TECHNICAL MEMO.,
     NOV 65   30P   SIMON,CHARLES W. :
REPT. NO. TM-2776,
CONTRACT: AF 19(628)-5166,

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFORMATION RETRIEVAL, DISPLAY
 SYSTEMS), (*HUMAN ENGINEERING, INFORMATION
 RETRIEVAL), DATA PROCESSING SYSTEMS, DATA STORAGE
 SYSTEMS, SYSTEMS ENGINEERING, PROGRAMMING
 LANGUAGES   (U)
IDENTIFIERS: GPDS PROJECT, LUCID LANGUAGE   (U)

  HUMAN ENGINEERING CONSIDERATIONS AND PLANS FOR THE
  STUDY AND EVALUATION OF THE GPDS/LUCID SYSTEM ARE
  DISCUSSED. SPECIFIC PROJECT GOALS ARE: (1) TO
  DETERMINE HOW WELL THE CURRENT SYSTEMS MATCH USERS'
  NEEDS, AND (2) TO MAKE RECOMMENDATIONS FOR
  IMPROVING THE SYSTEM WHERE THESE NEEDS ARE NOT MET.
  AN ULTIMATE PROJECT GOAL WILL BE TO DETERMINE HUMAN
  ENGINEERING DESIGN PRINCIPLES USEFUL FOR THE
  DEVELOPMENT OF USER-ORIENTED, ON-LINE INFORMATION
  PROCESSING SYSTEMS IN GENERAL. PROJECT
  INVESTIGATION WILL EXAMINE THE GPDS/LUCID SYSTEMS
  FROM THE POINT OF VIEW OF A USER WHO IS ESSENTIALLY
  UNSOPHISTICATED IN COMPUTER PROGRAMMING.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-631 182   5/8   5/5   22/2   9/2
  COMPUTER CONCEPTS INC LOS ANGELES CALIF
  THE ROLE OF COMPUTERS IN HANDLING AEROSPACE SYSTEMS
  HUMAN FACTORS TASK DATA.   (U)
DESCRIPTIVE NOTE: FINAL REPT. 3 JUN 64-3 JUN 65,
      DEC 65   183P   WHITEMAN,IRVIN R. ;
CONTRACT: AF 33(615)-1557,
PROJ: AF-1710,
TASK: 171006,
MONITOR: AMRL ,   TR-65-206

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-621 379.

DESCRIPTORS: (*DATA PROCESSING SYSTEMS, HUMAN
 ENGINEERING), (*HUMAN ENGINEERING, WEAPON
 SYSTEMS), (*SPACE FLIGHT, SYSTEMS ENGINEERING),
 (*AIR FORCE, SYSTEMS ENGINEERING), MANAGEMENT
 ENGINEERING, PERSONNEL MANAGEMENT, DECISION
 MAKING, AUTOMATION, INFORMATION RETRIEVAL,
 SUPERVISORY PERSONNEL, COMPUTERS, DATA STORAGE
 SYSTEMS, PERFORMANCE(HUMAN), GROUND SUPPORT
 EQUIPMENT   (U)

   THE CHARACTERISTICS OF A COMPUTER BASED DATA SYSTEM
   FOR HANDLING HUMAN FACTORS TASK INFORMATION GENERATED
   IN SUPPORT OF ADVANCED SYSTEM DEVELOPMENT ARE
   DESCRIBED. ON THE BASIS OF INFORMATION GATHERED
   FROM USERS AND GENERATORS OF DATA AT REPRESENTATIVE
   GOVERNMENT AND CONTRACTOR INSTALLATIONS, THE
   CURRENT AND POTENTIAL USES OF COMPUTERS WERE ASSESSED
   TO DETERMINE THE DESIRABLE CHARACTERISTICS FOR A
   COMPUTERIZED HUMAN FACTORS TASK DATA HANDLING SYSTEM.
   THE PROPOSED DATA HANDLING SYSTEM WILL ASSIST THE
   HUMAN FACTORS SPECIALIST AND SYSTEM DESIGN ENGINEERS
   IN THE DESIGN AND DEVELOPMENT OF SYSTEMS BY PROVIDING
   THEM WITH MEANS FOR: (1) DRAWING THEM CLOSER TO
   THE DATA THROUGH A USER-ORIENTED SYSTEM, (2)
   COMPARING DATA GENERATED THROUGHOUT THE LIFE-CYCLE OF
   AN ADVANCED SYSTEM AND ACROSS SYSTEMS, (3)
   ANALYZING DATA AND CONDUCTING MAN-MACHINE
   SIMULATIONS, AND (4) INSURING THAT DATA ARE MADE
   AVAILABLE ON A SELECTIVE QUERY AND A TIMELY BASIS.
   THESE OBJECTIVES ARE MET WITHIN THE FRAMEWORK OF A
   DATA SYSTEM CONCEPT REFERRED TO AS CENTRAL. THE
   FUNCTIONS OF CENTRAL ARE: (1) DATA STORAGE AND
   RETRIEVAL, (2) DATA PROCESSING, (3) COMPUTER
   PROGRAM MAINTENANCE, AND (4) SYSTEM OPERATIONAL
   MANUAL MAINTENANCE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-634 313   15/3   17/2   5/5
  ARMY PERSONNEL RESEARCH OFFICE WASHINGTON D C
  HUMAN FACTORS RESEARCH IN COMMAND INFORMATION
  PROCESSING SYSTEMS,   (U)
     MAR 66   27P   RINGEL, S. ;VICINO,F. L. ;
  ANDREWS,R. S. ;
REPT. NO. APRO-TRR-1145
PROJ: DA-2J0247O1A723,

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMAND + CONTROL SYSTEMS,
 DECISION MAKING), (*COMBAT INFORMATION CENTERS,
 *HUMAN ENGINEERING), DATA PROCESSING SYSTEMS,
 DISPLAY SYSTEMS, MILITARY REQUIREMENTS, MILITARY
 TACTICS, COMPUTERS, INFORMATION RETRIEVAL   (U)

  THE REPORT DESCRIBES THE SCOPE, RATIONALE,
  ORGANIZATION, AND PROGRESS OF A COMMAND SYSTEMS
  RESEARCH PROGRAM TO PROVIDE HUMAN FACTORS INFORMATION
  NEEDED FOR PERFORMANCE WITHIN COMPLEX AUTOMATED
  INFORMATION PROCESSING SYSTEMS. FOLLOWING A SURVEY
  OF MILITARY INFORMATION PROCESSING EQUIPMENT AND
  OPERATIONS AND FUTURE PLANS FOR COMMAND INFORMATION
  PROCESSING SYSTEMS, BASIC HUMAN FACTORS PROBLEMS WERE
  IDENTIFIED AND ORGANIZED AROUND FIVE CRITICAL
  OPERATIONS--SCREENING INCOMING DATA, TRANSFORMING RAW
  DATA FOR INPUT INTO STORAGE DEVICES, INPUT,
  ASSIMILATION OF DISPLAYED INFORMATION, AND DECISION
  MAKING. A RESEARCH PROGRAM WAS FORMULATED AND
  STUDIES UNDERTAKEN TO YIELD EMPIRICAL INFORMATION
  ABOUT THE EFFECTS ON HUMAN PERFORMANCE OF (1)
  CHARACTERISTICS OF THE INFORMATION PRESENTED
  (DENSITY, AMOUNT, ETC.); (2) DYNAMIC ASPECTS OF
  INFORMATION (TYPE, EXTENT, CODING OF UPDATES);
  (3) DISPLAY MODES AND SENSORY MODALITIES (GROUP
  VS INDIVIDUAL DISPLAYS, MULTISENSORY DISPLAYS); AND
  (4) COMPUTER AIDS TO THE DECISION PROCESS. A
  COMMAND SYSTEMS LABORATORY WAS DEVELOPED TO
  PERMIT SIMULATION OF VARIOUS TOS FUNCTIONS.
  FINDINGS HAVE SUGGESTED THE POSSIBILITY OF
  REDUCTION IN STORAGE CAPACITY REQUIREMENTS, NUMBER OF
  DISPLAYS CALLED FROM STORAGE DURING A GIVEN
  OPERATIONAL TIME PERIOD, AND TIME REQUIRED FOR THE
  TOTAL INFORMATION ASSIMILATION-DECISION PROCESS AND
  SUPPORTED THE INCORPORATION AND USE OF INFORMATION
  CONSPICUITY CODING CAPABILITIES IN COMMAND SYSTEMS.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-636 170   5/5   5/8   9/2
  INSTITUTE FOR DEFENSE ANALYSES ARLINGTON VA RESEARCH AND
  ENGINEERING SUPPORT DIV
  HUMAN FACTORS PROBLEMS IN COMPUTER-GENERATED GRAPHIC
  DISPLAYS.   (U)
     APR 66   118P   BARMACK, JOSEPH E. ;
  SINAIKO,H. WALLACE ;
REPT. NO. IDA/HG-66-4820,STUDY S-234
CONTRACT: SD-50,

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*HUMAN ENGINEERING, DISPLAY
 SYSTEMS), (*DISPLAY SYSTEMS, GRAPHICS),
 COMPUTERS, MAN-MACHINE SYSTEMS, INPUT-OUTPUT
 DEVICES, THEORY, LIGHT, COLORS   (U)

  THE STUDY IS A REVIEW OF CURRENT PRACTICES IN
  COMPUTER-GENERATED GRAPHIC DISPLAYS FROM THE POINT OF
  VIEW OF ENGINEERING PSYCHOLOGY. INPUT DEVICES,
  WHICH ARE INTEGRAL TO MAN-COMPUTER SYSTEMS, ARE ALSO
  CONSIDERED. THEORIES OF COGNITION ARE EXAMINED
  WITH RESPECT TO THEIR APPLICABILITY TO COMPUTER-
  GRAPHICS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-636 313   6/4   9/2
   SYSTEM RESEARCH LTD RICHMOND (ENGLAND)
   A CYBERNETIC MODEL OF HUMAN DATA PROCESSING.   (U)
         64   16P   PASK, GORDON :
CONTRACT: AF 61(052)-640,AF 61(052)-402

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED FOR PRESENTATION AT THE
 PROCEEDINGS OF THE INTERNATIONAL UNION OF
 PHYSIOLOGICAL SCIENCES. INTERNATIONAL CONGRESS
 (22ND) IN LEIDEN, 1962 P218-33.

DESCRIPTORS: (*CYBERNETICS, BEHAVIOR),
 (*BIONICS, BEHAVIOR), HUMANS, DATA PROCESSING
 SYSTEMS, LEARNING MAN-MACHINE SYSTEMS, GREAT
 BRITAIN   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-637 814   5/2   5/5   15/7
  ARMY PERSONNEL RESEARCH OFFICE WASHINGTON D C
  COMMAND INFORMATION PROCESSING SYSTEMS: A HUMAN
  FACTORS RESEARCH PROGRAM.   (U)
DESCRIPTIVE NOTE: TECHNICAL RESEARCH REPT.
    JUN 66   38P   RINGEL,SEYMOUR ;
REPT. NO. APRO-TRR-1148
PROJ: DA-2J0247C1A723,

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFORMATION RETRIEVAL, ARMY
 OPERATIONS), (*HUMAN ENGINEERING, INFORMATION
 RETRIEVAL), TACTICAL WARFARE, DATA PROCESSING
 SYSTEMS, COMMAND + CONTROL SYSTEMS, MAN-MACHINE
 SYSTEMS, COMPUTERS, MILITARY STRATEGY, DECISION
 MAKING, SYSTEMS ENGINEERING   (U)

  THE COMMAND SYSTEMS TASK SEEKS TO DEVELOP
  RESEARCH INFORMATION BY WHICH THE EFFECTIVENESS OF
  CURRENT AND FUTURE COMMAND INFORMATION PROCESSING
  SYSTEMS MAY BE MAXIMIZED. PURSUING ITS OBJECTIVE
  THROUGH INTENSIVE EXPERIMENTATION IN SPECIFIC ARMY
  MAN-MACHINE COMPLEXES, THE PRESENT PUBLICATION
  DESCRIBES THE SCOPE, RATIONALE, AND ORGANIZATION OF A
  RESEARCH PROGRAM TO PROVIDE THAT INFORMATION TO
  DESIGNERS, DEVELOPERS, AND USERS. THE PROGRAM
  REPRESENTS A COMPREHENSIVE APPROACH TO RESEARCH
  CONCERNED WITH AUTOMATED COMMAND INFORMATION
  PROCESSING SYSTEMS, RANGING FROM DETAILED STUDIES OF
  DISCRETE HUMAN FUNCTIONS TO INTEGRATION OF SIZABLE
  HIGHLY AUTOMATED COMPUTERIZED SYSTEMS. TASK EFFORT
  FOR THE PRESENT AND IN THE IMMEDIATE FUTURE WILL BE
  CONCENTRATED ON STUDIES DEALING WITH INFORMATION
  ASSIMILATION AND DECISION MAKING. THE REPORT
  DELINEATES A SERIES OF STUDIES IN PROGRESS OR
  PROJECTED ON NINE MAJOR ASPECTS OF THESE FUNCTIONS:
  (1) AMOUNT AND DENSITY OF INFORMATION; (2)
  SPECIFICITY OF INFORMATION; (3) ALPHA-NUMERIC
  AND SYMBOLIC PRESENTATION; (4) TYPE, EXTENT, AND
  RATE OF INFORMATION UPDATING; (5) CODING OF
  UPDATED INFORMATION AND HARD COPY; (6) SEQUENCE
  OF INFORMATION PRESENTATION; (7) INDIVIDUAL AND
  GROUP WORK METHODS AND DISPLAYS; (8) VISUAL AND
  AUDITORY DISPLAYS; (9) COMPUTER-AIDED
  PERFORMANCE. RESEARCH TO BE ACCOMPLISHED IN
  REMAINING SUBTASKS CONCERNED WITH PROBLEMS IN THE
  INFORMATION PREPARATION AND SYSTEM INTEGRATION AREAS
  IS MORE GENERALLY DISCUSSED. (AUTHOR)   (U)

AD-639 563   5/10   5/5   9/2
  RAND CORP SANTA MONIC CALIF
  MOTIVATIONAL PROBLEMS IN HUMAN-COMPUTER
  OPERATIONS.   (U)
      JUN 61   13P   JORDAN,NEHEMIAH I
REPT. NO. P-2332,

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE ANNUAL HUMAN
 ENGINEERING CONFERENCE (9TH), ST. LOUIS, MO., 1-
 2 JUN 61.

DESCRIPTORS: (*MOTIVATION, *COMPUTER OPERATORS),
 HUMAN ENGINEERING, MAN-MACHINE SYSTEMS,
 COMPUTERS   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-640 283   5/2   5/8   9/2
  INTERNATIONAL BUSINESS MACHINES CORP POUGHKEEPSIE N Y DATA
  SYSTEMS DIV
  PSYCHOLOGY FOR A MAN-MACHINE PROBLEM-SOLVING
  SYSTEM.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     FEB 65   22P   MILLER,ROBERT B. 1
REPT. NO. TR-00.1246,

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PROBLEM SOLVING, MAN-MACHINE
 SYSTEMS), (*INFORMATION RETRIEVAL, MAN-MACHINE
 SYSTEMS), COMPUTERS, HUMAN ENGINEERING, SUBJECT
 INDEXING, PSYCHOLOGY   (U)

  THE PAPER DEALS WITH THE USE OF COMPUTER
  CAPABILITIES TO EXTEND HUMAN CAPABILITIES FOR
  INVENTION AND DISCOVERY. A PROGRAMMATIC ROUTE IS
  PROPOSED FOR DEVELOPMENT. THE FIRST STAGE IN THIS
  ROUTE IS AN ANALYTIC ENUMERATION OF HUMAN ABILITIES
  AND LIABILITIES AS A PROBLEM-SOLVING MECHANISM.
  THE SECOND STAGE WILL DEAL WITH AN ANALYSIS OF
  HUMAN INFORMATION-HANDLING TASKS. THESE TWO STAGES
  SHOULD ILLUMINATE SYSTEM OBJECTIVES, WHILE AT THE
  SAME TIME OPTIONS FOR DESIGNING THE MAN-MACHINE
  PROBLEM-SOLVING ENTITY BECOME CLARIFIED. THE
  RESULT WILL BE AN INTELLIGENCE-RETRIEVAL SYSTEM
  COMBINED WITH LOGICAL AND EXTRAORDINARY DISPLAY
  CAPABILITIES. THE PRINCIPAL DESIGN ISSUES WILL BE
  REVEALED AS INDEXING CONTENT AND STRUCTURE AND
  DISPLAY SYMBOLOGIES. AN IMPORTANT (AND
  NEGLECTED) DIMENSION IN SYSTEM DESIGN IS THE
  HUMAN'S ABILITY TO LEARN AND THINK IN NEW LANGUAGES
  AND SYMBOLOGIES. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-647 092   5/10   12/1   9/2
  MICHIGAN UNIV ANN ARBOR INST OF SCIENCE AND
  TECHNOLOGY
  NONCONSERVATIVE PROBABILISTIC INFORMATION PROCESSING
  SYSTEMS.   (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL DOCUMENTARY REPT., SEP
  63-APR 66.
     DEC 66   95P   EDWARDS,WARD :
REPT. NO. 5893-22-F
CONTRACT: AF 19(628)-2823
PROJ: AF-2806
MONITOR: ESD   TR-66-404

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-646 101.

DESCRIPTORS: (*DATA PROCESSING SYSTEMS,
 PROBABILITY), (*DECISION MAKING, DATA
 PROCESSING SYSTEMS), HUMAN ENGINEERING, DECISION
 THEORY, EXPERIMENTAL DATA, GAME THEORY,
 PSYCHOMETRICS, DESIGN   (U)
IDENTIFIERS: BAYES' THEOREM   (U)

  THE REPORT IS CONCERNED WITH TWO LARGE-SCALE
  SIMULATION EXPERIMENTS ON PROBABILISTIC INFORMATION
  PROCESSING (PIP) SYSTEMS. ONE, A VERY LARGE AND
  PROLONGED STUDY OF FOUR SYSTEMS, YIELDED THE
  CONCLUSION THAT PIP IS INDEED AN EFFICIENT
  PHILOSOPHY FOR INFORMATION-PROCESSING SYSTEMS--AT
  LEAST TWICE AS EFFICIENT AS ITS NEXT-BEST COMPETITOR,
  AND FOUR TIMES AS EFFICIENT AS A REPRESENTATIVE OF
  CURRENT PROCESSING TECHNIQUES. THE SECOND PIP
  EXPERIMENT WAS CONCERNED WITH WHETHER LIKELIHOOD
  ESTIMATORS IN PIPS SHOULD BE ALLOWED TO KNOW THE
  STATE OF SYSTEM OPINION. THE DATA CONFIRM THE
  SUGGESTION THAT IT MIGHT BE UNDESIRABLE. THESE
  EXPERIMENTS REQUIRED THE USE OF AN ON-LINE COMPUTER
  SYSTEM. THIS COMPARISON OF PIP AND ITS
  COMPETITORS CLEARLY INDICATES THAT PIP IS SUPERIOR,
  BUT DOES NOT INDICATE HOW PIP COMPARES WITH
  THEORETICALLY OPTIMAL PERFORMANCE SINCE NO OBJECTIVE
  MODEL OF THE DATA-GENERATING PROCESS WAS AVAILABLE.
  A SMALLER-SCALE LABORATORY EXPERIMENT IS REPORTED
  THAT COMPARES PIP WITH A POSTERIOR-ODDS ESTIMATION
  SYSTEM (POP) IN A TASK SUFFICIENTLY COMPLEX TO BE
  DIFFICULT FOR SUBJECTS AND YET ALLOWING AN OBJECTIVE
  STANDARD OF CORRECT PERFORMANCE. PIP WAS FAR
  SUPERIOR TO POP. PIP AND CALCULATIONS OF OPTIMAL
  PERFORMANCE WERE ROUGHLY COMPARABLE, WITH PIP
  SOMETIMES MORE EXTREME THAN OPTIMAL PERFORMANCE AND
  SOMETIMES LESS EXTREME. ANOTHER SMALL LABORATORY   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-647 993   5/2   5/5
  SYSTEM DEVELOPMENT CORP DAYTON OHIO
  DEVELOPMENT AND APPLICATION OF COMPUTER SOFTWARE
  TECHNIQUES TO HUMAN FACTORS TASK DATA HANDLING
  PROBLEMS.   (U)
DESCRIPTIVE NOTE: FINAL REPT. 21 JUN 65-21 JUN 66,
      DEC 66   175P   POTTER,K. W. ;TULLEY,A.
  T. ;REED,LAWRENCE E. ;
CONTRACT: AF 19(628)-3416
PROJ: AF-1710
TASK: 171006
MONITOR: AMRL   TR-66-200

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: JOINT NASA/USAF STUDY.

DESCRIPTORS: (*DATA PROCESSING SYSTEMS, *HUMAN
 ENGINEERING), INFORMATION RETRIEVAL, COMPUTERS,
 CLASSIFICATION, VOCABULARY, DATA STORAGE
 SYSTEMS   (U)

  RESEARCH LEADING TO THE APPLICATION OF COMPUTER
  SOFTWARE TECHNIQUES FOR HANDLING HUMAN FACTORS TASK
  DATA GENERATED IN SUPPORT OF AEROSPACE SYSTEM
  DEVELOPMENT PROGRAMS IS DISCUSSED. IT IS
  RECOGNIZED THAT DATA HANDLING TECHNIQUES MUST BE
  DEVELOPED IN CONTEXT WITH THEIR TOTAL OPERATIVE
  ENVIRONMENT. A CONCEPT OF AN OPERATIONAL DATA
  MANAGEMENT SYSTEM FOR STORING, PROCESSING, AND
  RETRIEVING HUMAN FACTORS TASK DATA IN A GOVERNMENT/
  CONTRACTOR ENVIRONMENT IS DISCUSSED AND ILLUSTRATED.
  THIS CONCEPT IS PREDICATED ON THE ASSUMPTION THAT A
  USER-ORIENTED COMPUTERIZED DATA SYSTEM WILL HELP DRAW
  HUMAN FACTORS SPECIALISTS CLOSER TO THEIR DATA.
  FIVE PROBLEM AREAS, CONSIDERED TO BE FUNDAMENTAL TO
  THE DEVELOPMENT OF DATA HANDLING TECHNIQUES, WERE
  RESEARCHED. THESE AREAS ARE: (1) ANALYSIS
  OF HUMAN FACTORS TASK DATA, DATA RELATIONSHIPS, AND
  CLASSIFICATION SCHEMES, (2) APPLICATION OF
  VOCABULARY AND THESAURUS TECHNIQUES TO INCREASE THE
  EFFECTIVENESS OF COMMUNICATION AMONG MAN/MACHINE/
  SOFTWARE FUNCTIONS, (3) APPLICATION OF COMPUTER
  STORAGE AND RETRIEVAL TECHNIQUES TO HUMAN FACTORS
  TASK DATA, (4) APPLICATION OF ANALYTICAL AND
  SIMULATION TECHNIQUES TO HUMAN FACTORS TASK DATA, AND
  (5) APPLICATION OF CURRENT AWARENESS TECHNIQUES
  TO PROVIDE NOTIFICATIONS OF DATA AVAILABILITY.
  (AUTHOR)   (U)

DESCRIPTORS: (*LEARNING, HUMANS), (*LEARNING
  MACHINES, SYSTEMS ENGINEERING), DESIGN,
  CONTROL SYSTEMS, INFORMATION RETRIEVAL, DATA
  STORAGE SYSTEMS, DIGITAL COMPUTERS, DECISION
  MAKING, COMPUTER LOGIC, DECISION THEORY,
  PROGRAMMING(COMPUTERS), SWITCHING CIRCUITS,
  AUTOMATION, ARTIFICIAL INTELLIGENCE   (U)

   THE PAPER REVIEWS THE MAJOR ASPECTS OF HUMAN
   LEARNING, AND DISCUSSES SEVERAL LEARNING MECHANISMS
   AND SOME OF THE DESIGN PRINCIPLES FOR LEARNING
   SYSTEMS. A COMPARISON IS MADE BETWEEN HUMAN
   LEARNING AND MACHINE LEARNING. SOME ASPECTS OF
   HUMAN LEARNING ARE CONSIDERED IN THE DESIGN OF
   LEARNING SYSTEM. FOR THE PURPOSE OF ENGINEERING
   DESIGN, LEARNING IS REFERRED TO AS THE ACQUISITION OF
   SKILL TO PERFORM MEANINGFUL SELF-MODIFICATION AND TO
   IMPROVE PERFORMANCE ON THE BASIS OF PAST EXPERIENCE.
   THE THREE BASIC LEARNING MECHANISMS ARE LEARNING BY
   ROTE (ZEROTH-ORDER LEARNING), LEARNING BY
   SELECTIVE REINFORCEMENT (FIRST-ORDER LEARNING),
   AND LEARNING BY GENERALIZATION (SECOND-ORDER
   LEARNING). THE STORAGE AND RETRIEVAL OF PAST
   DATA AND INFORMATION PATTERN IN A DIGITAL COMPUTER,
   THE REWARD AND PUNISHMENT SCHEME, AND THE STATISTICAL
   INFERENCE AND BAYESIAN DECISION PROCESS ARE
   CONSIDERED AS THE ENGINEERING COUNTERPARTS OF THESE
   LEARNING MECHANISMS. THE FOUNDATIONS FOR THE
   DESIGN OF LEARNING SYSTEMS ARE THRESHOLD LOGIC,
   SWITCHING THEORY, DECISION THEORY, BAYESIAN
   STATISTICS, STOCHASTIC AUTOMATA, AND HEURISTIC
   PROGRAMMING. (AUTHOR)
                                              ( )

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-654 818   5/9   5/8
  GEORGE WASHINGTON UNIV ALEXANDRIA VA HUMAN RESOURCES
  RESEARCH OFFICE
  TRAINING RESEARCH UTILIZING MAN-COMPUTER
  INTERACTIONS: PROMISE AND REALITY,   (U)
       JUN 67   19P   MCCLELLAND,WILLIAM A. 1
REPT. NO. PROFESSIONAL PAPER 23-67
CONTRACT: DA-44-188-ARO-2

       UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AS PART OF THE AVIONICS
 PANEL PROGRAM ON NATURAL AND ARTIFICIAL LOGIC
 PROCESSORS, ADVISORY GROUP FOR AERONAUTICAL
 RESEARCH AND DEVELOPMENT, ATHENS, GREECE, JULY,
 1963.

DESCRIPTORS: (*TEACHING METHODS, *MAN-MACHINE
 SYSTEMS), LEARNING, COMPUTERS, TRAINING,
 MILITARY TRAINING, BEHAVIOR, GROUP DYNAMICS,
 DATA PROCESSING SYSTEMS, EFFECTIVENESS   (U)

   THE PAPER WAS PRESENTED AS PART OF THE AVIONICS
   PANEL PROGRAM ON NATURAL AND ARTIFICIAL
   LOGIC PROCESSORS, SPONSORED BY THE ADVISORY
   GROUP FOR AERONAUTICAL RESEARCH AND
   DEVELOPMENT, NATO. SEVERAL CONCEPTUAL
   PROPOSITIONS IN REGARD TO MAN AND THE COMPUTER ARE
   OFFERED. THE NATURE OF TRAINING RESEARCH IS
   EXAMINED. THERE IS ALSO A BRIEF CATEGORIZATION OF
   HUMAN BEHAVIOR TO SUGGEST SOME OF THE USES AND SOME
   OF THE DIFFICULTIES IN THE UTILIZATION OF COMPUTERS
   IN TRAINING RESEARCH. THE ROLE OF THE TRAINING
   RESEARCH PSYCHOLOGIST DEALING WITH LARGE GROUPS OF
   PEOPLE IN MASS INSTRUCTION IN A MILITARY SETTING IS
   DISCUSSED, AS IS THE IMPORTANCE OF THE COMPUTER FOR
   DATA PROCESSING AND AS A TOOL FOR SIMULATING COMPLEX
   BEHAVIOR. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-656 533   5/8   5/5   5/10
  MICHIGAN UNIV ANN ARBOR DEPT OF PSYCHOLOGY
  HUMAN INFORMATION-PROCESSING CONCEPTS FOR SYSTEM
  ENGINEERS,   (U)
          65   19P   PEW,RICHARD W. :
CONTRACT: AF 49(638)-1235
PROJ: AF-920F-5002
MONITOR: AFOSR   67-1799

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN SYSTEM ENGINEERING
  HANDBOOK P31-3-31-17 1965.

DESCRIPTORS: (*MAN-MACHINE SYSTEMS, SYSTEMS
 ENGINEERING), (*HUMAN ENGINEERING, MAN-MACHINE
 SYSTEMS), MEMORY, DECISION MAKING, DATA
 PROCESSING SYSTEMS, PSYCHOPHYSICS,
 PERCEPTION(PSYCHOLOGY)   (U)

  A DESIGN PHILOSOPHY IS PRESENTED FOR UTILIZING
  INFORMATION ABOUT HUMAN PERFORMANCE CAPACITIES AND
  LIMITATIONS IN THE DESIGN OF MAN-MACHINE SYSTEMS.
  SPECIFIC DATA CONCERNING MAN'S CAPABILITIES FOR
  PSYCHOPHYSICAL JUDGMENT, SPEEDED INFORMATION
  PROCESSING, MEMORY STORAGE AND PERCEPTUALMOTOR SKILLS
  ARE SURVEYED AND DESCRIBED IN ENGINEERING TERMS WHERE
  APPLICABLE. THE VEIW OF MAN AS A SINGLE CHANNEL
  LIMITED CAPACITY INFORMATION PROCESSING SYTEM IS
  ADVOCATED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-656 653   5/8   5/5   5/10
  MICHIGAN UNIV ANN ARBOR DEPT OF PSYCHOLOGY
  RECENT PSYCHOLOGICAL RESEARCH RELEVANT TO THE HUMAN
  FACTORS ENGINEERING OF MAN-MACHINE SYSTEMS,   (U)
          65   7P   PEW,RICHARD W. :
CONTRACT: AF 49(638)-1235
PROJ: AF-929F-5002
MONITOR: AFOSR   67-1824

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN PROCEEDINGS OF THE
  NATIONAL ELECTRONICS CONFERENCE 5P OCT 1965.

DESCRIPTORS: (*MAN-MACHINE SYSTEMS, *HUMAN
 ENGINEERING), DESIGN, SYSTEMS ENGINEERING,
 MEMORY, PSYCHOLOGY, BIONICS, DATA PROCESSING
 SYSTEMS, DECISION MAKING   (U)

  THE EMPHASIS OF THE REPORT WAS TO SURVEY A BODY OF
  PSYCHOLOGICAL THEORY AND TO ILLUSTRATE A SPECIFIC
  AREA IN WHICH THE THEORY AND ASSOCIATED EMPIRICAL
  DATA ARE RELEVANT TO SYSTEM DESIGN PROBLEMS.
  WITHIN THE FRAMEWORK DESCRIBING MAN AS A SINGLE-
  CHANNEL INFORMATION PROCESSOR AT LEAST, THERE ARE
  OTHER EQUALLY RELEVANT BODIES OF DATA. FOR
  EXAMPLE, RESEARCH ON THE FUNCTIONAL CHARACTERISTICS
  OF THE MEMORY SUBSYSTEM, ESPECIALLY SHORT-TERM MEMORY
  ARE AVAILABLE TO ALLOW RELATIVELY PRECISE
  SPECIFICATIONS OF TOLERABLE MEMORY LOAD, GIVEN THE
  NATURE OF THE MATERIAL TO BE REMEMBERED. THIS
  LITERATURE WOULD ALSO SUGGEST INFORMATION FORMAT AND
  CODING FOR OPTIMUM RECALL OR RETREVAL. SIMILARLY,
  THE ACCUMULATING BODY OF DATA FOCUSED ON ENGINEERING
  DESCRIPTIONS OF MAN AS A CONTROLLER IN FEEDBACK
  SYSTEMS ARE AVAILABLE FOR THOSE WITH PROBLEMS IN THIS
  AREA. IN SHORT IT IS THE CONTENTION OF THE PAPER
  THAT ONE SHOULD NOT RETREAT TO THE COMFORT OF HIS
  ARMCHAIR AND ITS ASSOCIATED INTUITIVE DESIGN
  TECHNIQUES WITHOUT FIRST MAKING A CONSCIENTIOUS
  EFFORT TO TALK TO PSYCHOLOGISTS ABOUT HIS PARTICULAR
  DESIGN PROBLEM AND TO SEEK OUT THE APPLICABLE
  LITERATURE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-656 701   5/5   5/10   5/9   9/2
  AEROSPACE MEDICAL RESEARCH LABS WRIGHT-PATTERSON AFB
  OHIO
  ADVANCES IN THE USE OF COMPUTERS FOR HANDLING HUMAN
  FACTORS TASK DATA,   (U)
       APR   67   16P   REED,LAWRENCE E. I
REPT. NO. AMRL-TR-67-16
PROJ: AF-1710
TASK: 171006

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN INTERNATIONAL SIMULATION
 AND TRAINING CONFERENCE (3RD), NEW YORK, 24-27
 APRIL 1967. SUPPORTED BY NASA AND CONTRACT
 F33615-67-C-1036 WITH THE SYSTEM DEVELOPMENT CORP.

DESCRIPTORS: (*HUMAN ENGINEERING, *DATA
 PROCESSING SYSTEMS), (*JOB ANALYSIS, HUMAN
 ENGINEERING), SYSTEMS ENGINEERING, TRAINING,
 COMPUTERS, ANALYSIS, DATA, PERSONNEL
 MANAGEMENT   (U)

  THE PURPOSE OF THE PAPER IS TO REVIEW SOME OF THE
  DATA PROBLEMS THE ANALYST MUST DEAL WITH IN HIS WORK
  AND TO SUGGEST SOME POSSIBLE REMEDIES. A REVIEW OF
  THE TASK ANALYSIS PROCEDURES IS FOLLOWED BY A
  DISCUSSION OF THE USES OF TASK ANALYSIS IN SYSTEM
  DEVELOPMENT PROGRAMS. PROBLEMS CONNECTED WITH EACH
  WERE USED TO GENERATE THE GOALS OF A RESEARCH
  PROGRAM, WHICH IS DIRECTED TOWARD THE DEVELOPMENT OF
  COMPUTERIZED TECHNIQUES TO ASSIST THE ANALYST MAKE
  BETTER USE OF AVAILABLE DATA. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-656 709   5/10   5/8   5/5
  MICHIGAN UNIV ANN ARBOR DEPT OF PSYCHOLOGY
  HUMAN PERFORMANCE IN INFORMATION PROCESSING AND
  STORAGE.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
      JUL 67   72P   MELTON,ARTHUR W. I
REPT. NO. 05823-41-F
CONTRACT: AF 49(638)-1235, ARPA ORDER-461
PROJ: AF-5002, ORA-05823
MONITOR: AFOSR   67-1874

       UNCLASSIFIED REPORT

DESCRIPTORS: (*HUMAN ENGINEERING, *MAN-MACHINE
 SYSTEMS), INFORMATION THEORY, STIMULATION,
 PERFORMANCE(HUMAN), REACTION(PSYCHOLOGY),
 REFLEXES, ATTENTION, SENSORY PERCEPTION,
 MEMORY, CENTRAL NERVOUS SYSTEM, RESPONSES,
 INFORMATION RETRIEVAL, RECALL, RESEARCH PROGRAM
 ADMINISTRATION   (U)
IDENTIFIERS: INFORMATION
 PROCESSING(PSYCHOLOGY)   (U)

  RESEARCH WAS CONDUCTED IN THE GENERAL FIELD OF
  ENGINEERING PSYCHOLOGY, AND SPECIFICALLY ON HUMAN
  PERFORMANCE. THIS RESEARCH IS DESIGNED TO PRODUCE
  A TAXONOMY OF HUMAN INFORMATION-PROCESSING FUNCTIONS,
  TO DETERMINE HUMAN CAPABILITIES AND LIMITATIONS IN
  FULFILLING BASIC INFORMATION-PROCESSING FUNCTIONS, TO
  DEVELOP A MODEL OF HUMAN SHORT-TERM MEMORY IN THE
  INTEREST OF ADVANCING BASIC KNOWLEDGE OF HUMAN
  INFORMATION PROCESSES.   (U)

AD-663 209   5/5   2
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  IMPLEMENTATION OF COMPUTER SOFTWARE TECHNIQUES TO
  HUMAN FACTORS TASK DATA HANDLING PROBLEMS,   (U)
DESCRIPTIVE NOTE: FINAL REPT. 21 JUN 66-30 JUN 67,
     SEP 67   102P   TULLEY,A. T. ;MEYER,G.
  R. ;
CONTRACT: F33615-67-C-1036
PROJ: AF-1710
TASK: 171006
MONITOR: AMRL   TR-67-127

          UNCLASSIFIED REPORT

DESCRIPTORS: (*HUMAN ENGINEERING, *DATA
 PROCESSING SYSTEMS), COMPUTERS, INFORMATION
 RETRIEVAL, DATA STORAGE SYSTEMS, SYSTEMS
 ENGINEERING   (U)

  RESEARCH LEADING TO THE IMPLEMENTATION OF COMPUTER
  SOFTWARE TECHNIQUES FOR HANDLING HUMAN FACTORS TASK
  DATA GENERATED IN SUPPORT OF AEROSPACE SYSTEM
  DEVELOPMENT PROGRAMS IS DISCUSSED. TECHNIQUES
  BEING EXPLORED IN THIS RESEARCH PROGRAM ARE BASED ON
  THE ASSUMPTION THAT A USER-ORIENTED COMPUTERIZED DATA
  SYSTEM WILL HELP DRAW HUMAN FACTORS SPECIALISTS
  CLOSER TO NEEDED DATA. THE APPLICATION OF SUCH A
  SYSTEM WILL REDUCE THE PROBLEM OF DATA ACCESSIBILITY
  AND ALLOW MORE EFFECTIVE USE OF DATA IN THE SYSTEM
  ENGINEERING PROCESS. PRELIMINARY RESEARCH LEADING
  TO PROPOSED DATA HANDLING TECHNIQUES IS DISCUSSED.
  A COMPUTERIZED DATA HANDLING SYSTEM TO STORE,
  RETRIEVE, AND PROCESS HUMAN FACTORS TASK DATA IS
  INITIALLY IMPLEMENTED THROUGH A PILOT STUDY. A
  DISCUSSION OF THE PILOT STUDY SPECIFICATION IS
  FOLLOWED BY A PRESENTATION OF THE DESIGN
  SPECIFICATION FOR A COMPUTERIZED EXPERIMENTAL SYSTEM.
  THE EXPERIMENTAL SYSTEM, REFERRED TO AS THE PILOT
  STUDY EXPERIMENTAL SYSTEM, PROVIDES THE PRIMARY MEANS
  FOR DEMONSTRATING AND EVALUATING THE RESEARCH RESULTS
  AGAINST THE ORIGINAL RESEARCH GOALS. COMPUTER
  SOFTWARE DESCRIPTIONS ARE PRESENTED FOR IMPLEMENTING
  THE PILOT STUDY EXPERIMENTAL SYSTEM IN A USER-
  ORIENTED ENVIRONMENT IN TERMS OF INFORMATION NEEDS OF
  HUMAN FACTORS SPECIALISTS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-671 128   5/8   5/5
  GEORGE WASHINGTON UNIV ALEXANDRIA VA HUMAN RESOURCES
  RESEARCH OFFICE
  A CONCEPT OF THE ROLE OF MAN IN AUTOMATED
  SYSTEMS,   (U)
      MAY 68   11P   MELCHING,WILLIAM H. ;
REPT. NO. PROFESSIONAL PAPER-14-68
CONTRACT: DA-44-188-ARO-2
PROJ: DA-2J024701A712
TASK: 2J024701A712-01

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE SOUTHWESTERN
 PSYCHOLOGICAL ASSOCIATION ANNUAL MEETING, NEW
 ORLEANS, LA., APR 1968.

DESCRIPTORS: (*MAN-MACHINE SYSTEMS, HUMAN
 ENGINEERING), (*HUMAN ENGINEERING, *DECISION
 MAKING), SYMPOSIA, NATIONAL DEFENSE,
 ANTIMISSILE DEFENSE SYSTEMS, AUTOMATIC,
 COMPUTERS, SYSTEMS ENGINEERING, MALFUNCTIONS,
 SELECTION   (U)
IDENTIFIERS: SYSTEM OVERRIDE, MANUAL FUNCTIONS,
 SYSTEM OVERLOAD   (U)

  A PROBLEM THAT HAS LONG PLAGUED SYSTEM DESIGNERS
  AND HUMAN FACTORS ENGINEERS IS THAT OF ALLOCATION OF
  FUNCTIONS BETWEEN MAN AND MACHINE. THIS PAPER
  REPORTS AN ATTEMPT TO ISOLATE AND IDENTIFY FACTORS
  PERTINENT TO MAKING ALLOCATION DECISIONS. FROM AN
  ANALYSIS OF THE FUNCTIONS AND MISSIONS OF SEVERAL
  AUTOMATED SYSTEMS, SIX FACTORS WERE SHOWN TO BE
  HIGHLY RELEVANT TO ALLOCATION DECISIONS. ONE
  FACTOR, MAN'S ROLE IN AUTOMATED SYSTEMS, EMERGED AS A
  VARIABLE OF PARTICULAR INTEREST. IN ADDITION, FOUR
  CLASSES OF MANUAL FUNCTIONS COMMON TO ALL AUTOMATED
  SYSTEMS WERE IDENTIFIED. IT WAS DETERMINED THAT
  THESE CLASSES, IN TURN, CONSTITUTED A MEANINGFUL
  DESCRIPTION OF THE ROLE OF MAN IN TODAY'S AUTOMATED
  SYSTEMS. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC0463

AD-671 531   5/2   5/5   9/2
  SYSTEM DEVELOPMENT CORP DAYTON OHIO
  COMPUTERIZED HUMAN FACTORS TASK DATA HANDLING
  TECHNIQUES. USER'S AND CONTROLLER'S OPERATING
  GUIDES.   (U)
DESCRIPTIVE NOTE: FINAL REPT. 30 JUN-31 OCT 67,
      MAR 68   148P   REARDON,SUE E. :
CONTRACT: F33615-67-C-1036
PROJ: AF-1710
TASK: 171006
MONITOR: AMRL   TR-67-226

          UNCLASSIFIED REPORT

DESCRIPTORS: (*HUMAN ENGINEERING, INFORMATION
 RETRIEVAL), (*INFORMATION RETRIEVAL, *DATA
 PROCESSING SYSTEMS), DATA STORAGE SYSTEMS,
 INSTRUCTION MANUALS, PERSONNEL,
 PERFORMANCE(HUMAN), HAZARDS, ERRORS, TIME
 SHARING, TELETYPE SYSTEMS, DIGITAL COMPUTERS   (U)
IDENTIFIERS: PROFILE MATCHING, AN/FSQ-32   (U)

  INSTRUCTIONS ARE PRESENTED FOR THE OPERATION OF AN
  EXPERIMENTAL COMPUTERIZED DATA HANDLING SYSTEM.
  THESE INSTRUCTIONS WERE DEVELOPED AS PART OF THE
  OVERALL RESEARCH INTO A USER-ORIENTED COMPUTERIZED
  SYSTEM TO STORE, RETRIEVE, AND PROCESS HUMAN FACTORS
  TASK DATA. THESE INSTRUCTIONS ARE INTENDED AS A
  MODEL FOR FUTURE OPERATING GUIDES. (AUTHOR)   (U)

PROGRAMMED INSTRUCTION

AD-282 679
  AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO
  INVESTIGATIONS IN COMPUTER-AIDED DESIGN FOR
  NUMERICALLY CONTROLLED PRODUCTION   (U)
     MAY 62   IV   ROSS,D.T.ICOONS,S.A.I
REPT. NO. TR7 820IR 138
CONTRACT: AF33 600 42859
MONITOR: ASD   TR7 820

         UNCLASSIFIED REPORT

DESCRIPTORS: *AUTOMATIC, *DATA PROCESSING SYSTEMS,
 *MACHINE TOOLS, *PROGRAMMING (COMPUTERS), ANALYSIS,
 COMPUTERS, DESIGN, DISPLAY SYSTEMS, INSTRUMENTATION,
 INTEGRATION, MECHANICAL ENGINEERING, NUMERICAL
 ANALYSIS, OPERATORS (MATHEMATICS), OSCILLOSCOPES,
 STRESSES   (U)

  THE COMPUTER-AIDED DESIGN PROJECT IS ENGAGED IN A
  PROGRAM OF RESEARCH INTO THE APPLICATION OF THE
  CONCEPTS AND TECHNIQUES OF MODERN DATA PROCESSING TO
  THE DESIGN OF MECHANICAL PARTS, AND THE FURTHER
  DEVELOPMENT OF AUTOMATIC PROGRAMMING (APT) SYSTEMS
  FOR NUMERICALLY CONTROLLED MACHINE TOOLS. THIS
  COMBINED INTERIM REPORT COVERS THE FIFTEENTH
  THROUGH TWENTY-SIXTH MONTHS OF THE PROJECT. TOPICS
  COVERED INCLUDE: A DESCRIPTION OF CURRENT STATUS ON
  THE BASIC BOOTSTRAP COMPILER, THE AVAILABLE PROGRAMS
  OF THE BOOTSTRAP PLATEAU SYSTEM, AND THE MULTI-PASS
  COMPILER; DISCUSSION OF A NEW FIRST-PASS ALGORITHM
  WHICH IS BELIEVED TO HAVE WIDE APPLICABILITY TO ALL
  FORMS OF PROBLEM STATEMENT; DESCRIPTIONS OF THREE
  MANUAL INTERVENTION CONSOLE DESIGNS--A RUDIMENTARY
  VERSION NOW OPERATING ON THE 709 COMPUTER, A PROPOSED
  VERSION FOR THE 709, AND A STUDY OF A REMOTE CONSOLE
  FOR A LARGE-SCALE CENTRAL COMPUTER; COMPUTER STUDIES
  IN THREE-DIMENSIONAL SHAPE DESCRIPTION AND STRESS
  ANALYSIS; AND PLANS FOR PILOT STUDIES IN PIN-JOINTED
  TRUSSES AND SCULPTURED PARTS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-288 837
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  PROGRAMMED DECISIONS IN PROGRAMMED INSTRUCTION   (U)
      AUG 62   IV   COULSON,JOHN E.:
REPT. NO. CP 933 001 00

        UNCLASSIFIED REPORT

DESCRIPTORS: *AUTOMATION, *EDUCATION, *TEACHING
 MACHINES, DATA PROCESSING SYSTEMS, DIGITAL COMPUTERS,
 HUMAN ENGINEERING, LEARNING, PROGRAMMING (COMPUTERS),
 STUDENTS   (U)

 FLEXIBLE SEQUENCES KNOWN AS BRANCHING PROGRAMS ARE USED TO
 ADAPT TEACHING MATERIALS TO INDIVIDUALSTUDENTS.

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-404 086
  MITRE CORP BEDFORD MASS
  PROGRAMMED INSTRUCTION. A SELECTED
  BIBLIOGRAPHY,   (U)
     APR 63   111P   MORRILL,C.S.;HALPERT,D.T.;
  PILSUCKC,S.H.;
REPT. NO. SR69 1
CONTRACT: AF33 600 39852
PROJ: 702
MONITOR: ESD   TDR62 225

        UNCLASSIFIED REPORT

DESCRIPTORS: *EDUCATION, *PROGRAMMING COM
 PUTERS, *BIBLIOGRAPHIES AUTOMATION, TRAINING
 DEVICES, DOCUMENTATION, TEACHING MACHINES,
 READING, INSTRUCTORS,   (U)

 BIBLIOGRAPHY OF REFERENCES ON PROGRAMMED INSTRUCTION.

-1

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-610 698
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  REMOTE COMPUTER USAGE: IMPLICATIONS FOR
  EDUCATION.   (U)
DESCRIPTIVE NOTE: PROFESSIONAL PAPER,
     JAN   65   13P   ROWAN,T. C. ;
REPT. NO.   SP-165J

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE 1964 TIMS-ORSA
 JOINT NATIONAL MEETING SEP 64.

DESCRIPTORS: (*EDUCATION, COMPUTERS), (*COMPUTERS,
 EDUCATION), TEACHING MACHINES, SIMULATION, INFORMATION
 RETRIEVAL, INSTRUCTORS, REMOTE CONTROL SYSTEMS,
 CYBERNETICS   (U)
IDENTIFIERS: TIME SHARING (COMPUTERS), PROGRAMMED
 INSTRUCTION   (U)

  EXPERIMENTAL OPERATION OF COMPUTERS BY MULTIPLE
  USERS LOCATED REMOTELY IS BEING EXTENDED WITH
  INCREASING MOMENTUM INTO A VARIETY OF FIELDS.
  PROBLEMS WITH EQUIPMENT, COMPUTER PROGRAMS, AND
  OTHER SYSTEM ELEMENTS ARE BEING EXAMINED, AND
  PRELIMINARY SOLUTIONS ARE BEING TESTED AND EVALUATED.
  THE PAPER BRIEFLY REVIEWS THESE DEVELOPMENTS AND
  DISCUSSES THE FOLLOWING AND SEVERAL OTHER IMPORTANT
  IMPLICATIONS FOR EDUCATION: THE IMPACT ON CLASSROOM
  PROCEDURES, CURRICULUM DESIGN, AND PROGRAMMED
  INSTRUCTION; THE CONSEQUENT CENTRALIZATION OF
  ADMINISTRATIVE SUPPORT AND EFFECTS ON LOCAL AUTONOMY;
  THE RESULTING ACCELERATION IN THE INTRODUCTION OF
  COMPUTERS IN TECHNICAL EDUCATION AT THE UNIVERSITY,
  COLLEGE, AND SECONDARY-SCHOOL LEVEL. (AUTHOR)   (U)

AD-630 981   5/9   9/2
  NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF
  EFFECTIVENESS OF PROGRAMMED INSTRUCTIONAL MATERIALS
  DESIGNED TO INTEGRATE LOWER-LEVEL SUPPORTING
  BEHAVIORS INTO HIGHER-LEVEL BEHAVIORS IN A LEARNING
  PROGRAM FOR COMPUTER FLOW CHART DESIGN.   (U)
DESCRIPTIVE NOTE: TECHNICAL BULLETIN (FINAL),
     FEB 66   39P   FORD,JOHN D. ,JR.:
  MEYER,JOHN K. :
REPT. NO. STB-66-24,
PROJ: PF017030210,

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-646 880.

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, FLOW
 CHARTING), (*FLOW CHARTING, TEACHING METHODS),
 (*COMPUTERS, FLOW CHARTING), (*TRAINING,
 PROGRAMMING(COMPUTERS)), DESIGN, APTITUDE
 TESTS, BEHAVIOR, INSTRUCTION MANUALS,
 LEARNING   (U)
IDENTIFIERS: HIERARCHY, SYMBOLS   (U)

  THE STUDY SOUGHT TO EVALUATE A PRELIMINARY VERSION
 OF A LEARNING PROGRAM DESIGNED TO TEACH COMPUTER FLOW
 CHARTING. A METHOD SUGGESTED BY GAGNE WAS
 APPLIED TO THE TASK OF DESIGNING COMPUTER FLOW
 CHARTS. ANALYSIS BEGAN BY IDENTIFYING THE
 SUPPORTING BEHAVIORS NEEDED TO PERFORM THE CRITERION
 TASK. IT WAS IMPOSSIBLE TO OBTAIN A COMPLETE
 HIERARCHICAL STRUCTURE FOR THE FLOW CHARTING TASK.
 INSTRUCTIONAL MATERIALS WERE DEVELOPED FOR
 VIRTUALLY ALL OF THE LEARNING SETS. THESE
 MATERIALS COMPRISED THE BASIC OR CONTROL PROGRAM.
 IN THE EXPERIMENTAL PROGRAM INTEGRATIVE
 INSTRUCTIONAL MATERIALS WERE ADDED TO THE CONTROL
 PROGRAM. EACH TRAINEE SPENT 15 HOURS ON A PROGRAM.
 TRAINEE FLOW CHARTS WERE RATED ON THREE SKILLS,
 (1) SYMBOLIC REPRESENTATION, (2) CONFIGURAL
 DESIGN, AND (3) CONCEPTUAL FORMULATION.
 MODERATE SUPPORT FOR A HIERARCHICAL TASK STRUCTURE
 IS FOUND FOR THE SKILL AREA OF SYMBOLIC
 REPRESENTATION. THE REMAINING TWO AREAS SEEM TO
 CONFORM MUCH LESS TO A HIERARCHICAL ORGANIZATION.
 IN ADDITION TO THE DATA OBTAINED BY RATINGS,
 OBSERVATION OF TRAINEES WHILE THEY WORKED ON FLOW
 CHART DESIGN PROBLEMS UNCOVERED PROCEDURAL OR PROCESS
 BEHAVIORS WHICH CHARACTERIZED THE MORE SUCCESSFUL
 TRAINEES. (AUTHOR)   (U)

AD-632 462   5/9
  SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
  ANALYSIS OF INSTRUCTIONAL SYSTEMS.   (U)
DESCRIPTIVE NOTE: FINAL REPT. (TECHNICAL MEMO.),
     APR 66   267P   COGSWELL,JOHN F. ;
  BRATTEN,J. E. ;EGBERT,R. E. ;ESTAVAN,D. P. ;
  YETT,F. A. ;
REPT. NO. TM-1493/201/00.

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON NEW SOLUTIONS TO
  IMPLEMENTING INSTRUCTIONAL MEDIA THROUGH ANALYSIS
  AND SIMULATION OF SCHOOL ORGANIZATION. SEE ALSO
  AD-427 752, AD-436 528, AD-620 663, PB-167 675,
  PB-169 043.

DESCRIPTORS: (*EDUCATION, *TEACHING MACHINES),
  (*PROGRAMMED INSTRUCTION, ANALYSIS), COMPUTERS,
  STUDENTS, MODELS(SIMULATIONS),
  PROGRAMMING(COMPUTERS), DATA PROCESSING SYSTEMS,
  AUTOMATION, SCHEDULING, SIMULATION, LEARNING,
  SYSTEMS ENGINEERING   (U)
IDENTIFIERS: SCHOOLS, SYSTEMS ANALYSIS, EDSIM   (U)

  THE MAJOR FINDINGS INCLUDE THE IDENTIFICATION OF
  TWO WAYS FOR USING SYSTEM ANALYSIS IN EDUCATION, THE
  SPECIFICATION OF PROCEDURES FOR CONDUCTING ANALYSES
  OF INSTRUCTIONAL SYSTEMS, AND IMPLICATIONS FOR SCHOOL
  ORGANIZATION. ALTHOUGH THERE IS A DEFINITE TREND IN
  SECONDARY EDUCATION TO SEARCH OUT AND INTRODUCE WAYS
  TO ALTER SCHOOL ORGANIZATIONS SO THAT THE INDIVIDUAL
  DIFFERENCES AMONG STUDENTS CAN BE ACCOMMODATED, NO
  SCHOOL HAS YET EVOLVED AN ORGANIZATION TO
  SUCCESSFULLY MEET THIS OBJECTIVE. SCHOOLS STRIVING
  IN THIS DIRECTION ARE PRESENTLY BLOCKED BECAUSE THEY
  LACK TWO MAJOR RESOURCES; (1) ADEQUATE SELF-
  STUDY INSTRUCTIONAL MATERIALS, AND (2) ADEQUATE
  SYSTEMS TO PROVIDE INFORMATION TO INSTRUCTORS,
  COUNSELORS, AND ADMINISTRATORS ABOUT THE STATUS OF
  STUDENTS AS INDIVIDUALS. RECOMMENDATIONS FOR
  ATTACKING THESE PROBLEMS GROWING OUT OF THE STUDY
  INCLUDE: (1) CONTINUED DEVELOPMENT OF THE
  COMPUTER -BASED SYSTEM TO ASSIST STUDENTS AND
  COUNSELORS IN ACADEMIC PLANNING THAT WAS STARTED IN
  THE PROJECT; (2) CONTINUED STUDY OF THE USE OF
  INFORMATION PROCESSING IN THE CLASSROOM TO DESIGN
  SYSTEMS THAT WILL COLLECT, STORE, AND DISPLAY STUDENT
  INFORMATION SO THAT IT CAN BE USED IN THE IMMEDIATE
  INSTRUCTIONAL PROCESS; (3) IN-SERVICE TRAINING OF
  INFLUENTIAL SCHOOL PERSONNEL IN THE SKILLS OF
  DESIGNING INDIVIDUALIZED COURSE MATERIALS; AND   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-636 406   5/9
  ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
  THE USE OF PROGRAMMED LEARNING AND COMPUTER BASED
  INSTRUCTION TECHNIQUES TO TEACH ELECTRICAL
  ENGINEERING NETWORK ANALYSIS.   (U)
     JUL 66   85P   JOHNSON, ROGER L. I
REPT. NO. R-297,
CONTRACT: DA-28-043-AMC-00073(E),NONR-3985(08)
PROJ: DA-20014501B31F;

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, *ELECTRICAL
 ENGINEERING), COMPUTERS, LEARNING, STUDENTS,
 EFFECTIVENESS, TEACHING METHODS, TRAINING,
 PERFORMANCE(HUMAN), CIRCUITS, EFFECTIVENESS,
 TEACHING MACHINES   (U)
IDENTIFIERS: PLATO TEACHING SYSTEM   (U)

  TWO TYPES OF PROGRAMMED INSTRUCTION SEQUENCES
  (INQUIRY AND TUTORIAL) WERE USED ON THE PLATO
  SYSTEM TO TEACH ELECTRICAL NETWORK ANALYSIS (EE
  322, UNIVERSITY OF ILLINOIS). TWO GROUPS OF
  STUDENTS WERE SELECTED TO USE EACH OF THE TWO TYPES
  OF INSTRUCTION. BOTH OF THE INSTRUCTION SEQUENCES
  WERE TO PROVIDE THE SAME PERFORMANCE OBJECTIVES.
  THE REPORT DESCRIBES THE DESIGN AND USE OF THE
  INSTRUCTION ON THE PLATO TEACHING SYSTEM AND
  SUMMARIZES THE PERFORMANCE OF THE STUDENTS WITH
  RESPECT TO THE TWO METHODS OF TEACHING. THE STUDY
  INDICATED THAT THE DESIRED PERFORMANCE OBJECTIVES
  WERE OBTAINED SATISFACTORILY IN BOTH CASES,
  ALTHOUGH IN CERTAIN ASPECTS THE INQUIRY TEACHING
  PROGRAM EXHIBITED SOME ADVANTAGES. A TEACHING PROGRAM
  WHICH COULD MAKE AVAILABLE ALL OF THE FACILITIES
  CONTAINED IN THE PRESENT PROGRAMS WOULD BE MORE
  DESIRABLE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. Z00483

AD-638 676   5/9   9/2
  ILLINOIS UNIV URBANA TRAINING RESEARCH LAB
  PROJECT SOCRATES: A FLEXIBLE RESEARCH FACILITY TO BE
  USED IN STUDIES OF PREPROGRAMED SELF-INSTRUCTION
  (PSI) AND SELF-PROGRAMED INDIVIDUALIZED EDUCATION
  (SPIE).   (U)
DESCRIPTIVE NOTE: FINAL REPT.
     SEP 66   31P   STOLUROW;LAWRENCE M. I
CONTRACT: NONR-3985(04);
PROJ: NR-154-239;

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, SCIENTIFIC
 RESEARCH), (*EDUCATION, SCIENTIFIC RESEARCH),
 (*TEACHING MACHINES, LEARNING), PSYCHOLOGY,
 CYBERNETICS, TEACHING METHODS, STUDENTS,
 COMPUTERS, BIBLIOGRAPHIES   (U)
IDENTIFIERS: SOCRATES   (U)

  THIS IS THE FINAL REPORT OF WORK ACCOMPLISHED ON
  PROJECT SOCRATES (SYSTEM FOR ORGANIZING
  CONTENT TO REVIEW AND TEACH EDUCATIONAL
  SUBJECTS). THE PROJECT CONTRIBUTED TO THE
  DEVELOPMENT AND OPERATION OF A COMPUTER-BASED
  FACILITY FOR PSYCHOLOGICAL RESEARCH ON VARIABLES
  ASSOCIATED WITH PRE-PROGRAMED SELF-INSTRUCTION (PSI)
  AND SELF-PROGRAMED INDIVUALIZED EDUCATION (SPIE).
  THE RESEARCH WAS CONCERNED WITH THE DEVELOPMENT OF
  PSYCHOLOGICAL THEORY AND RESEARCH RELATING TO THE
  DESIGN AND USE OF A COMPUTER-BASED INSTRUCTIONAL
  SYSTEM. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ID0463

AD-638 891   5/9   18/5
  NAVAL PERSONNEL RESEARCH ACTIVITY SAN DIEGO CALIF
  COMPUTERIZED TRAINING INPUT PLAN FOR NUCLEAR
  POWERPLANT OPERATORS.   (U)
DESCRIPTIVE NOTE: RESEARCH REPT.
     JUN 66   54P   CONNER,RICHARD D. ;COLVIN,R.
  L. ;
REPT. NO: SRR-66-22;
PROJ: PF016010904;

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, NUCLEAR
 ENGINEERING), (*NUCLEAR POWER PLANTS,
 OPERATORS(PERSONNEL)), NAVAL PERSONNEL,
 TEACHING METHODS, COMPUTERS   (U)

  THE REPORT DESCRIBES THE DEVELOPMENT AND
  APPLICATION OF A COMPUTERIZED MODEL FOR PLANNING A
  CONTINUOUS, SUFFICIENT INPUT TO THE BASIC NUCLEAR
  POWER SCHOOL, CLASS C. THE NAVY ENLISTED
  CLASSIFICATION (NEC) CODE ASSIGNED TO PERSONNEL
  DESIGNATED FOR THIS SCHOOL IS 9901; HENCE, THIS MODEL
  IS REFERRED TO AS THE 9901 PLANNING MODEL. THIS
  MODEL CONSIDERS FOUR DIFFERENT SOURCES OF STUDENT
  INPUT, AND THEIR ASSOCIATED ATTRITION RATES, AND
  PROGRAMS THE PERSONNEL INTO THE SCHOOL OVER A PERIOD
  OF 22 CALENDAR QUARTERS (66 MONTHS). THE MODEL,
  WHICH AUTOMATES ALL ASPECTS OF THE 9901 PLANNING
  PROCEDURES, WILL NOT ONLY RELIEVE THE PRESENT
  COMPUTATIONAL BURDEN AND ELIMINATE CALCULATION
  ERRORS, BUT ALSO WILL PROVIDE RESULTS EARLIER IN THE
  PLANNING PERIOD, THUS PERMITTING THE TESTING OF MANY
  MORE POLICY ALTERNATIVES THAN IS POSSIBLE UNDER
  CURRENT PROCEDURES. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-645 121   5/9
  GENERAL ELECTRIC CO SANTA BARBARA CALIF TEMPO
  COMPUTER AUGMENTED LEARNING,   (U)
      NOV 66   29P   KINDRED,J. I
REPT. NO. 66TMP-55

        UNCLASSIFIED REPORT

DESCRIPTORS: (*LEARNING, TRAINING DEVICES),
  (*TRAINING DEVICES, COMPUTERS), (*TEACHING
  MACHINES, COMPUTERS), (*PROGRAMMED INSTRUCTION,
  LEARNING), EDUCATION, STUDENTS   (U)

  THE REPORT CONTAINS A DESCRIPTION AND SUMMARY OF
  COMPUTER AUGMENTED LEARNING DEVICES AND SYSTEMS.
  THE DEVICES ARE OF TWO GENERAL TYPES: PROGRAMMED
  INSTRUCTION SYSTEMS BASED ON THE TEACHING MACHINES
  PIONEERED BY PRESSEY AND DEVELOPED BY SKINNER,
  AND THE SO-CALLED 'DOCILE' SYSTEMS THAT PERMIT
  GREATER USER-DIRECTION WITH THE COMPUTER UNDER
  STUDENT CONTROL. EVEN SYMPATHETIC CRITICISMS BY
  PRACTITIONERS REVEAL LIMITED UNDERSTANDING OF THE
  PSYCHOLOGY OF LEARNING AND KNOWING, EXPOSE POTENTIAL
  RESTRICTIONS TO ADEQUATE SELECTION OF COMPUTER-BASED
  CURRICULA, AND RECOGNIZE TECHNICAL HAZARDS THAT
  IMPEDE THE DEVELOPMENT OF EFFECTIVE COMPUTERIZED
  EDUCATIONAL TOOLS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-646 651   5/9
  UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF
  PSYCHOLOGY
  TRAINING CORRECTIVE MAINTENANCE PERFORMANCE ON
  ELECTRONIC EQUIPMENT WITH CAI TERMINALS: I. A
  FEASIBILITY STUDY.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     DEC 66   41P   RIGNEY,JOSEPH W. I
REPT. NO. TR-51
CONTRACT: NONR-228(22)
PROJ: NR-153-093

      UNCLASSIFIED REPORT

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, ELECTRONIC
 TECHNICIANS), FEASIBILITY STUDIES, PROGRAMMING
 LANGUAGES, COMPUTERS, TESTS, LEARNING,
 PERFORMANCE(HUMAN), ELECTRONIC EQUIPMENT   (U)
 IDENTIFIERS: COMPUTER-AIDED INSTRUCTION   (U)

  A REPORT IS GIVEN OF A FEASIBILITY STUDY IN WHICH
  SEVERAL POSSIBLE RELATIONSHIPS BETWEEN STUDENT,
  COMPUTER TERMINAL, AND ELECTRONIC EQUIPMENT WERE
  CONSIDERED. THE SIMPLEST OF THESE CONFIGURATIONS
  WAS SET UP AND EXAMINED IN TERMS OF ITS FEASIBILITY
  FOR TEACHING THE PERFORMANCE OF FAULT LOCALIZATION ON
  A NAVY TRANSCEIVER. AN INSTRUCTIONAL PROGRAM WAS
  WRITTEN IN THE COURSEWRITER LANGUAGE. THE
  PROGRAM GUIDES A STUDENT THROUGH A FAULT LOCALIZATION
  STRATEGY DURING SEVERAL PRACTICE PROBLEMS, PROVIDING
  KNOWLEDGE OF RESULTS AND REMEDIAL INSTRUCTION. IT
  THEN RECORDS KEY STUDENT RESPONSES DURING THE
  ADMINISTRATION OF TEST PROBLEMS. CONCLUSIONS OF THE
  STUDY ARE: (1) SIMPLE CAI PROGRAMMING
  LANGUAGES CAN BE QUICKLY LEARNED BY ELECTRONICS
  INSTRUCTORS WHO ARE NOT TRAINED PROGRAMMERS; THESE
  LANGUAGES MUST BE SUPPLEMENTED BY MORE POWERFUL
  LANGUAGES IF THE FULL POTENTIAL OF CAI FOR
  PERFORMANCE TRAINING IS TO BE REALIZED. (2)
  COMPUTER-GUIDED PRACTICE IN FOLLOWING TROUBLE-
  ISOLATION SEQUENCES CAN FACILITATE EFFECTIVE
  TROUBLESHOOTING PERFORMANCE. EVEN A FEW HOURS OF
  SUCH PRACTICE CAN SHOW INTERESTING RESULTS. (3)
  THERE ARE SEVERAL ATTRACTIVE POSSIBILITIES FOR
  COMBINING THE COMPUTER TERMINAL WITH ELECTRONIC
  EQUIPMENT TO PROVIDE FOR ON-LINE SENSING OF STUDENT
  ACTIONS ON THE EQUIPMENT. TWO MAJOR APPROACHES
  EMERGE: CONSOLE-EQUIPMENT COMBINATIONS TO TEACH
  PERFORMANCE ON SPECIFIC EQUIPMENT, AND CONSOLE-
  EQUIPMENT COMBINATIONS TO TEACH GENERALIZABLE SKILLS,
  SUCH AS ALIGNMENT PROCEDURES AND BRACKETING LOGIC. (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-647 407   5/9
  RESEARCH ANALYSIS CORP MCLEAN VA
  PROGRAMMED INSTRUCTION AND TEACHING MACHINES IN THE
  FIELD OF MEDICAL EDUCATION: AN ANNOTATED
  BIBLIOGRAPHY.   (U)
DESCRIPTIVE NOTE: TECHNICAL PAPER,
    NOV 66   20P   REYNOLDS,LAURA A. I
REPT. NO. RAC-TP-235

        UNCLASSIFIED REPORT

DESCRIPTORS: (*MEDICAL PERSONNEL, EDUCATION),
 (*MEDICINE, *PROGRAMMED INSTRUCTION), TEACHING
MACHINES, TEACHING METHODS, ABSTRACTS,
BIBLIOGRAPHIES, COMPUTERS, LEARNING   (U)

  THE BIBLIOGRAPHY CONTAINS A SELECTED LIST OF
  ARTICLES AND REPORTS, WITH ANNOTATIONS, REGARDING
  PROGRAMMED INSTRUCTION AND TEACHING MACHINES IN THE
  FIELD OF MEDICINE. AUTHORS' ABSTRACTS, WITH
  OCCASIONAL MINOR CHANGES, ARE GIVEN WHERE AVAILABLE.
  PAPERS THAT HAVE BEEN WRITTEN CONCERNING THE USE OF
  COMPUTERS AS TEACHING MACHINES ARE INCLUDED.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-649 051   6/9   9/2   5/2
  AMERICAN INSTITUTES FOR RESEARCH PITTSBURGH PA
  DEVELOPMENT AND EVALUATION OF SELF-INSTRUCTIONAL
  TEXTS AND AN OPERATIONAL SPECIFICATION FOR COMPUTER
  DIRECTED TRAINING IN INTERMEDIATE QUERY LANGUAGE,
  MODEL 11, FOR SYSTEM 473L, UNITED STATES AIR FORCE
  HEADQUARTERS.   (U)
DESCRIPTIVE NOTE: FINAL REPT..
     OCT 66   70P   SLOUGH,DORIS CLAPP ;
  YENS,DAVID P. ;NORTHRUP,JUDI L. ;
  SHETTEL,HARRIS H. ;
CONTRACT: AF 19(628)-2935
PROJ: AF-7682
TASK: 768204
MONITOR: ESD   TR-66-637

          UNCLASSIFIED REPORT

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, *AIR FORCE
 TRAINING), (*INFORMATION RETRIEVAL, PROGRAMMED
 INSTRUCTION), (*COMMAND - CONTROL SYSTEMS,
 INFORMATION RETRIEVAL), COMPUTERS,
 EFFECTIVENESS, SPECIFICATIONS   (U)
IDENTIFIERS: EVALUATION   (U)

  THE REPORT SUMMARIZES THE DEVELOPMENT AND
  EVALUATION OF A PROGRAMED, SELF-INSTRUCTIONAL COURSE
  FOR ON-THE-JOB TRAINING OF AIR STAFF PERSONNEL IN
  THE USE OF INTERMEDIATE QUERY LANGUAGE, MODEL
  II. THIS IS AN INFORMATION RETRIEVAL LANGUAGE
  USED WITH THE COMPUTER BASED, AIR FORCE COMMAND
  AND CONTROL SYSTEM, SYSTEM 473L. IN ADDITION,
  IT DESCRIBES A COMPUTER DIRECTED TRAINING CAPABILITY
  THAT WAS DESIGNED SPECIFICALLY TO USE SYSTEM 473L
  ITSELF TO EFFECTIVELY AND EFFICIENTLY PROVIDE
  TRAINING IN QUERY LANGUAGE. THE REPORT
  DESCRIBES THE NEED FOR ON-THE-JOB TRAINING AND THE
  RATIONALE FOR A COMPUTER DIRECTED TRAINING CAPABILITY
  TO PROVIDE THIS TRAINING. IT DESCRIBES THE
  DEVELOPMENT OF THE PROGRAMED TEXT, THE TEXT ITSELF,
  AND THE EFFECTIVENESS OF THE TEXT MATERIALS BASED ON
  TRYOUT DATA. FINALLY, A DESCRIPTION OF THE
  PROPOSED COMPUTER DIRECTED TRAINING COURSE IS GIVEN,
  WITH EMPHASIS ON THE TRAINING DESIGN. (AUTHOR)   (U)

AD-651 035   5/9
  FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
  ON THE USE OF UNIVERSAL ELECTRONIC COMPUTERS FOR
  PROGRAMMED INSTRUCTION,   (U)
     MAR 67   26P   KURYAKOV,V. G. ;
REPT. NO. FTD-MT-65-202
MONITOR: TT   67-61650

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: OB ISPOLZOVANII UNIVERSALNYKH
 ELEKTRONNO-VYCHISLITERLNYKH MASHIN DLYA
 PROGRAMMIROVANNOGO OBUCHENIYA, EDITED MACHINE TRANS. OF
 MONO. PROGRAMMIROVANNOE OBUCHENIE I KIBERNETICHESKIE
 OBUCHAIUSHCHIE MASHINY, N. P. 1963 P.39-59.

DESCRIPTORS: (*PROGRAMMED INSTRUCTION, DIGITAL
 COMPUTERS), (*TEACHING MACHINES, DESIGN),
 TRAINING, FILM READERS, AUTOMATIC, INPUT-
 OUTPUT DEVICES, GERMAN LANGUAGE, RUSSIAN LANGUAGE,
 USSR   (U)

  A DISCUSSION IS GIVEN OF CERTAIN RESULTS OF
  EXPERIMENTAL APPLICATION OF DIGITAL COMPUTERS TO
  PROGRAMMED LEARNING AND THE PRINCIPLES OF
  CONSTRUCTING TEACHING SYSTEMS. THREE MODELS OF THE
  TEACHING PROCESS ARE PRESENTED: PARALLEL,
  SEQUENTIAL, AND BRANCHING. A BLOCK DIAGRAM IS
  GIVEN FOR A TRAINING SYSTEM USING AN ELECTRONIC
  COMPUTER, AND USE OF THE 'URAL-1' MACHINE WITH
  ST-35 INSTRUMENTS AS INPUTS IS DISCUSSED FOR
  TEACHING TRANSLATION FROM GERMAN TO RUSSIAN AND
  DESIGN OF RADIO RECEIVERS. USE OF MULTIPURPOSE
  COMPUTERS (UMSHN /UNIVERSALNAYA MASHINA
  SHIROKOGO NAZNACHENIYA/) WITH AUTOMATIC FILM
  VIEWERS AS OUTPUT DEVICES FOR STUDY OF RADIOTECHNICAL
  CIRCUITS IS DESCRIBED.   (U)

AD-651 052   5/9
  GEORGE WASHINGTON UNIV ALEXANDRIA VA HUMAN RESOURCES
  RESEARCH OFFICE
  PROGRAMMED LEARNING: PROLOGUE TO INSTRUCTION,   (U)
      JAN 66   13P   SEIDEL,ROBERT J. I
REPT. NO. PROFESSIONAL PAPER-17-67
CONTRACT: DA-44-188-ARO-2

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN PSYCHOLOGICAL REPORTS
  V20 N1 P307-16 FEB 1967.

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 *LEARNING), REVIEWS, COMPUTERS, PSYCHOLOGY,
 PROBLEM SOLVING   (U)

  THE PAPER INDICATES SOME PERTINENT ISSUES IN THE
  FIELD OF PROGRAMMED INSTRUCTION (PI) AND SUGGESTS
  PROMISING DIRECTIONS FOR FUTURE GROWTH OF PI, BOTH
  AS A MEDIUM FOR THE APPLICATION OF PRINCIPLES OF
  LEARNING AND AS A MEANS OF FURTHERING OUR
  UNDERSTANDING OF LEARNING PROCESSES. PRACTICAL AND
  THEORETICAL IMPLICATIONS ARE TOUCHED UPON AND
  COMBINED TO GIVE A POSITION STATEMENT ON PI AS A
  PEDAGOGICAL AND PSYCHOLOGICAL RESEARCH TOOL. IN
  THIS VEIN THE UTILITY AND INEVITABILITY OF COMPUTER-
  AIDED INSTRUCTION ARE DISCUSSED. (AUTHOR)   (U)

AD-655 374   5/9   5/8
  MASSACHUSETTS INST OF TECH CAMBRIDGE ENGINEERING PROJECTS
  LAB
  INVESTIGATIONS IN COMPUTER-AIDED INSTRUCTION AND
  COMPUTER-AIDED CONTROLS.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
     APR 67   29P   ROSENBERG,R. C. ;
  MCCANDLISH,S. G. ;SHERIDAN,T. B. ;
CONTRACT: AF 19(628)-3317
PROJ: AF-7682, DSR-9960-4
TASK: 768204
MONITOR: ESD   TR-67-289

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-640 681.

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 EFFECTIVENESS), TEACHING METHODS, COMPUTERS,
 AUTOMATION, MAN-MACHINE SYSTEMS, TEACHING
 MACHINES   (U)

  A SUMMARY IS PRESENTED OF TWO RESEARCH PROJECTS IN
  THE AREA OF COMPUTER-AIDED INSTRUCTION AND MAN-
  COMPUTER INTERACTION. IN 1965 ROSENBERG
  COMPLETED A STUDY ENTITLED COMPUTER AIDED
  TEACHING OF DYNAMIC SYSTEM BEHAVIOR (AD-640
  681). THIS STUDY DEMONSTRATED THAT WITHIN THE
  DELIMITED AREA OF FORMAL ENGINEERING THEORY A
  COMPUTER SIMULATED LABORATORY COULD BE BUILT IN WHICH
  FRESHMAN STUDENTS COULD POSE PROBLEMS, OBSERVE
  DISPLAYS OF MACHINE RESPONSES, AND THEREBY LEARN
  FORMAL DISCIPLINE WITH ONLY MINOR INTERACTION WITH A
  HUMAN TEACHER. AN OUTLINE OF ROSENBERG'S
  EXPERIMENT AND CONCLUSIONS IS GIVEN IN THIS REPORT,
  ALONG WITH SOME MORE GENERAL 'OBSERVATIONS ON THE
  USE OF COMPUTERS IN INSTRUCTION,' DEALING WITH
  PROSPECTS FOR COMPUTERIZED TRACKING MONITORS. IN
  JUNE 1966 MCCANDLISH COMPLETED A STUDY ENTITLED
  A COMPUTER SIMULATION EXPERIMENT OF
  SUPERVISORY CONTROL OF REMOTE MANIPULATION,
  (TO BE PUBLISHED). MCCANDLISH SUMMARIZES
  HOW, FOR A FORMALLY WELL-DEFINED TASK LIKE GRASPING A
  BLOCK WITH A PAIR OF JAWS, REMOVING THE BLOCK FROM A
  HOLE AND PLACING IT IN A SECOND HOLE, THE HUMAN CAN
  PERFORM THE TASK THROUGH THE COMPUTER, BUT ONLY WITH
  CERTAIN DIFFICULTIES. HE INVESTIGATED SUCH DISPLAY
  RATE, TIME DELAY BETWEEN HUMAN RESPONSES AND
  KNOWLEDGE OF RESULTS, AND NATURE OF COMMAND
  STATEMENTS. AN OUTLINE OF MCCANDLISH'S
  EXPERIMENT AND CONCLUSIONS IS GIVEN IN THIS REPORT
  FOLLOWED BY 'OBSERVATIONS ON THE RELATION   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. Z00463

AD-656 613   5/9   4/1
  GEORGE WASHINGTON UNIV ALEXANDRIA VA HUMAN RESOURCES
  RESEARCH OFFICE
  COMPUTER-ADMINISTERED INSTRUCTION VERSUS
  TRADITIONALLY ADMINISTERED INSTRUCTION:
  ECONOMICS,   (U)
      JUN 67   43P   KOPSTEIN,FELIX F. ;
  SEIDEL,ROBERT J. ;
REPT. NO. PROFESSIONAL PAPER 31-67
CONTRACT: DA-44-188-ARO-2
PROJ: DA-2J024701A712-01

       UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE NATIONAL SOCIETY
 FOR PROGRAMMED INSTRUCTION, BOSTON, MASS., APRIL
 1967.

DESCRIPTORS: (*TEACHING METHODS, COST
 EFFECTIVENESS), COMPUTERS, INSTRUCTORS,
 PROGRAMMED INSTRUCTION, ECONOMICS, EDUCATION,
 MILITARY TRAINING, PROGRAMMING(COMPUTERS)   (U)

  AN ATTEMPT IS MADE TO ASSAY THE ECONOMICS OF
  COMPUTER-ADMINISTERED INSTRUCTION (CAI) VERSUS
  TRADITIONALLY ADMINISTERED INSTRUCTION (TAI) IN
  CONTROLLING THE STRUCTURE OF THE LEARNER'S STIMULUS
  ENVIRONMENT IN TEACHING AND TRAINING SITUATIONS.
  THERE IS A DISCUSSION OF THE NEED FOR A SOUND,
  OBJECTIVE ECONOMIC APPRAISAL OF THE VALUE TO SOCIETY
  AS A WHOLE OF INCREMENTS IN THE BREADTH AND DEPTH OF
  EDUCATION IN THE POPULATION, AND OF THE INFLUENCE OF
  VARYING RATES WITH WHICH THESE INCREMENTS ARE BROUGHT
  ABOUT. THE NECESSITY FOR RELIABLE, OBJECTIVE
  INFORMATION CONCERNING COST DATA IS EMPHASIZED.
  PROJECTED COST/EFFECTIVENESS COMPARISONS BASED ON
  THE ASSUMPTION OF EQUAL EFFECTIVENESS FOR CAI AND
  TAI ARE DISCUSSED FOR BOTH CIVILIAN AND MILITARY
  INSTRUCTION. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. Z00463

AD-657 190   5/9   12/2
  STANFORD UNIV CALIF INST IN ENGINEERING-ECONOMIC
  SYSTEMS
  QUANTITATIVE METHODS IN COMPUTER-DIRECTED TEACHING
  SYSTEMS.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
     MAR 6   171P   SMALLWOOD,RICHARD D. ;
  WEINSTEIN, RAY J. ;ECKLES,JAMES E ;
CONTRACT: NONR-225(84)

        UNCLASSIFIED REPORT

DESCRIPTORS: (*EDUCATION, SYSTEMS ENGINEERING),
 (*TEACHING METHODS, SYSTEMS ENGINEERING),
 PROGRAMMED INSTRUCTION, MATHEMATICAL MODELS,
 LEARNING, DECISION MAKING, DYNAMIC PROGRAMMING,
 DECISION THEORY, OPTIMIZATION, TIME SHARING,
 COMPUTERS, OPERATIONS RESEARCH   (U)

  THE REPORT FORMULATES IN QUANTITATIVE TERMS THE
  DECISION PROBLEM ASSOCIATED WITH THE DESIGN OF A
  COMPUTER-DIRECTED TEACHING SYSTEM. THIS
  FORMULATION IS THEN USED TO DIRECT A THEORETICAL
  INQUIRY INTO SOME OF THE ASPECTS OF THIS PROBLEM THAT
  ARE RELEVANT TO THE DESIGN OF A QUANTITATIVE DECISION
  PROCESS WITHIN A PRACTICAL TEACHING SYSTEM. SOME
  OF THE PROBLEMS ATTACKED INCLUDE: THE DEVELOPMENT
  OF A CLASS OF MODELS FOR CONCEPTUAL LEARNING, THE
  STUDY OF A DECISION THEORETIC PROCEDURE FOR THE
  SELECTION OF THE MODEL FROM A CLASS OF MODELS, THE
  INVESTIGATION OF OPTIMUM TEACHING STRATEGIES (IN AN
  ECONOMIC SENSE) FOR A SIMPLE LEARNING MODEL, THE
  DERIVATION OF THE OPTIMUM QUANTIZATION OF A PAST
  HISTORY PARAMETER FOR A SIMPLE TEACHING SYSTEM, A
  CONSIDERATION OF THE INFORMATION-REWARD TRADE OFF IN
  COMPUTER-DIRECTED TEACHING SYSTEMS, AND A PRELIMINARY
  FORMULATION OF THE OPTIMUM DESIGN PROBLEM FOR A TIME-
  SHARED TEACHING SYSTEM. THE REPORT CONCLUDES WITH
  A DISCUSSION OF DIRECTIONS FOR FUTURE RESEARCH.
  (AUTHOR)   (U)

DOC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD04A3

AD-657 384   5/7
   UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ACOUSTICS
   PHONETICS RESEARCH LAB
   STUDIES IN THE PHONOLOGY OF ASIAN LANGUAGES. V.
   ACOUSTIC FEATURES IN THE MANNER-DIFFERENTIATION OF
   KOREAN STOP CONSONANTS.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT. JUL 66-JUL 67,
     JUL 67   57P   HAN, MIEKO S. ;
   WEITZMAN, RAYMOND S. ;
CONTRACT: NONR-228(28)
PROJ: NR-049-183

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-637 827.

DESCRIPTORS: (*LANGUAGE, ASIA), (*PHONETICS,
 ANALYSIS), SPEECH, ACOUSTICS, SPEECH
 REPRESENTATION   (U)
IDENTIFIERS: KOREAN LANGUAGE   (U)

   IN KOREAN NINE STOP CONSONANTS--THE ASPIRATED
   BILABIAL, DENTAL, AND VELAR STOPS; THE WEAK BILABIAL,
   DENTAL, AND VELAR STOPS; AND THE STRONG BILABIAL,
   DENTAL, AND VELAR STOPS--CONTRAST WITH EACH OTHER,
   IN ORDER TO DETERMINE THOSE ACOUSTIC FEATURES
   INVOLVED IN THE MANNER DIFFERENTIATION OF THESE
   STOPS, A FAIRLY LARGE AMOUNT OF DATA WAS COLLECTED,
   AND A NUMBER OF SPEECH SYNTHESIS EXPERIMENTS WERE
   CARRIED OUT USING THE TAPE CUTTING AND SPLICING
   METHOD. THESE STUDIES REVEALED THAT ASPIRATED
   STOPS ARE DISTINGUISHED FROM WEAK AND STRONG STOPS
   PRIMARILY BY THE TIMING OF THE VOICE ONSET.
   ASPIRATED STOPS WERE FOUND TO BE 2.4 TO 5.3 TIMES
   LONGER THAN WEAK STOPS AND EVEN LONGER THAN THIS
   COMPARED TO STRONG STOPS. THE CUES FOR THE
   DISTINCTION BETWEEN WEAK AND STRONG STOPS SEEM TO BE
   (1) THE INTENSITY BUILD-UP IN THE FIRST FEW
   CENTISECONDS OF VOICING FOLLOWING STOP RELEASE, WHICH
   IS GENERALLY SLOWER WITH WEAK STOPS THAN WITH STRONG
   STOPS AND (2) THE PEAK AMPLITUDE OF THE FIRST
   PERIOD OF VOICING. THESE FINDINGS INDICATE THAT
   THE DIFFERENCE BETWEEN THESE STOPS IS A FUNCTION OF
   THE SLOPE OF THE LEADING EDGE OF THE INTENSITY
   CONTOUR DURING THE FIRST FEW CENTISECONDS OF VOICING
   FOLLOWING THE STOP RELEASE. RELATIVE TO A GIVEN
   SPEAKER, IF THE SLOPE RISES ABRUPTLY, THE STOP WILL
   BE HEARD AS STRONG, AND IF IT RISES GRADUALLY, THE
   STOP WILL BE HEARD AS WEAK. (AUTHOR)   (U)

AD-658 869   5/9   9/2
  HARVARD COMPUTING CENTER CAMBRIDGE MASS
  COMPUTER-ASSISTED INSTRUCTION (CAI).   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
      JUN 67   86P   STOLUROW,LAWRENCE M. ;
REPT. NO: TR-2
CONTRACT: N00014-67-A-0298

           UNCLASSIFIED REPORT

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 *COMPUTERS), PROBLEM SOLVING, TEACHING
 METHODS, THEORY, MULTIPLE OPERATION, STUDENTS,
 EDUCATION   (U)
 IDENTIFIERS: COMPUTER-AIDED INSTRUCTION   (U)

  THE PURPOSES OF CAI ARE DESCRIBED. FIVE MODES
OF USE ARE DESCRIBED: PROBLEM SOLVING: DRILL AND
PRACTICE: SIMULATION AND GAMING: TUTORIAL
INSTRUCTION: AND AUTHOR. THE MULTI-MEDIA CHARACTER
OF CAI IS DESCRIBED. A MODEL OF CAI IS
DEVELOPED: IT IS THE IDIOGRAPHIC CONTINGENCY MODEL
(ICM). THE MODEL TREATS INSTRUCTION AS A
MULTIPLE DECISION PROCESS. THE FIRST IS THE
PRETUTORIAL: THE SECOND IS THE TUTORIAL PROCESS: THE
THIRD PROCESS   CONCERNED WITH MAINTAINING OR
CHANGING THE TEACHING PROGRAM BY ALTERING THE
TEACHING STRATEGY (LOGIC). IMPLICATIONS FOR
CURRICULUM PLANNING, MAN-MACHINE RELATIONS, OPERATION
AND ASSESSMENT AND EVALUATION ARE DISCUSSED.
(AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-658 873   5/9   9/2
  HARVARD COMPUTING CENTER CAMBRIDGE MASS
  THE HARVARD UNIVERSITY COMPUTER-ASSISTED INSTRUCTION
  LABORATORY.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     MAY 67   24P   STOLUROW,LAWRENCE M. I
REPT. NO. TR-1
CONTRACT: N00014-67-A-0298

        UNCLASSIFIED REPORT

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 *COMPUTERS), TIME SHARING, EDUCATION,
 PROBLEM SOLVING, LABORATORIES, COMPUTER
 PERSONNEL, FEASIBILITY STUDIES, MANAGEMENT
 PLANNING   (U)
:DENTIFIERS: COMPUTER-AIDED INSTRUCTION   (U)

  THE REPORT DESCRIBES THE PURPOSE, ORGANIZATION AND
  PLAN OF THE HARVARD CAI LABORATORY.
  (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZC3463

AD-666 303   5/9   9/2
  IBM FEDERAL SYSTEMS DIV GAITHERSBURG MD
  COMPUTER-ASSISTED INSTRUCTION FOR THE NATIONAL
  MILITARY COMMAND SYSTEM INFORMATION PROCESSING SYSTEM
  (CAINIPS).   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
     FEB 68   374P   CARMODY,R. W. ;
CONTRACT: DCA-100-67-C-0037
MONITOR: NMCSSC   TR-15-69

         UNCLASSIFIED REPORT

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 COMPUTERS), TEACHING METHODS, TRAINING,
 EXPERIMENTAL DESIGN, STUDENTS, LEARNING,
 EFFECTIVENESS, COSTS, ANALYSIS OF VARIANCE,
 COMPUTER LOGIC   (U)
IDENTIFIERS: *COMPUTER AIDED INSTRUCTION,
 INFORMATION PROCESSING, NATIONAL MILITARY
 COMMAND SYSTEM INFORMATION PROCESSING
 SYSTEM   (U)

  THE PAPER DESCRIBES AN EXPERIMENT WHICH UTILIZED A
  COMPUTER-BASED INSTRUCTIONAL SYSTEM TO TEACH A
  SEGMENT OF THE NIPS TRAINING PROGRAM.
  DESCRIPTIONS OF THE PROJECT DESIGN, PROJECT
  IMPLEMENTATION, AND PROJECT RESULTS AND DISCUSSION
  ARE INCLUDED. THE RESULTS OF THIS EXPERIMENT HAVE
  DEMONSTRATED THAT A COMPUTER-BASED INSTRUCTIONAL
  SYSTEM COULD BE USED TO TEACH STUDENTS SIGNIFICANTLY
  BETTER, AND IN LESS TIME, THAN THE CONVENTIONAL
  LECTURE INSTRUCTION FOR THIS SEGMENT OF THE NIPS
  TRAINING PROGRAM. ALSO INCLUDED ARE RESULTS OF AN
  INVESTIGATION OF METHOD/MEDIA INTERACTIONS WITHIN THE
  COMPUTER-BASED INSTRUCTIONAL SYSTEM. THESE RESULTS
  CAN BE USED TO DESIGN AND IMPLEMENT A MORE ADAPTIVE
  COMPUTERIZED TRAINING PROGRAM. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD04₃3

AD-672 187   5/9   5/2   9/2
   HARVARD COMPUTING CENTER CAMBRIDGE MASS
   A COMPUTER-BASED SYSTEM INTEGRATING INSTRUCTION AND
   INFORMATION RETRIEVAL: A DESCRIPTION OF SOME
   METHODOLOGICAL CONSIDERATIONS.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
      FEB 68   44P   SELIG,JUDITH A. ;
   REINECKE,ROBERT D. ;STOLUROW,LAWRENCE M. ;
REPT. NO. TR-5
CONTRACT: N00014-67-A-0298

         UNCLASSIFIED REPORT

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 *INFORMATION RETRIEVAL), TEACHING METHODS,
 BIBLIOGRAPHIES, SYSTEMS ENGINEERING, DATA
 STORAGE SYSTEMS, TEACHING MACHINES,
 PROGRAMMING(COMPUTERS), OPHTHALMOLOGY   (U)
IDENTIFIERS: *COMPUTER AIDED INSTRUCTION, SUBJECT
 INDEX TERMS, IBM 7010 COMPUTERS, IBM 1401
 COMPUTERS   (U)

   THE WORK INCLUDES THE DEVELOPMENT OF A CONCORDANCE
   AND THE CONVERSION OF THE PROGRAMMED TEXTBOOK BASIC
   OPHTHALMOLOGY, BY ROBERT D. REINECKE,
   M.D. AND ROBERT J. HERM, M.D., TO
   COMPUTER-ASSISTED INSTRUCTION ON THE IBM 7010 AND
   IBM 1401 SYSTEMS. ESSENTIALLY THE REPORT
   DESCRIBES THE METHODOLOGY USED TO LOAD A LARGE BODY
   OF TEXT ONTO A COMPUTER. AN EFFORT WAS MADE TO
   DOCUMENT AND EXPLAIN ALL STEPS, INCLUDING THOSE WHICH
   WERE ABANDONED, IN ORDER TO AVOID UNNECESSARY
   DUPLICATION IN THE FUTURE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZD0463

AD-672 189   5/9
  UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES ELECTRONICS
  PERSONNEL RESEARCH GROUP
  COMPUTER-AIDED TECHNICAL TRAINING USING ELECTRONIC
  EQUIPMENT ON-LINE WITH THE CAI SYSTEM.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     JUN 68   41P   HUGGETT,GEOFFREY :
  DAVIS;DANIEL J. ;RIGNEY,JOSEPH W. :
REPT. NO: TR-59
CONTRACT: NONR-228(22)
PROJ: NR-153-093

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH
 ILLINOIS UNIV., URBANA. COMPUTER-BASED
 EDUCATION RESEARCH LAB.

DESCRIPTORS: (*PROGRAMMED INSTRUCTION,
 MAINTENANCE PERSONNEL), TRANSMITTER-RECEIVERS,
 MAINTENANCE, RADIO COMMUNICATION SYSTEMS,
 TEACHING METHODS, STUDENTS, CORRECTIONS,
 COMPUTER   (U)
IDENTIFIERS: *COMPUTER AIDED INSTRUCTION, AN/
 URC-32, TROUBLESHOOTING, ON-LINE SYSTEMS,
 PLATO TEACHING SYSTEM   (U)

  THE REPORT DESCRIBES AN EXPERIMENTAL COURSE IN THE
  OPERATION AND TROUBLESHOOTING OF A COMMUNICATIONS
  TRANSCEIVER, THE AN/URC-32, IN WHICH THE
  TRANSCEIVER IS USED AS PART OF AN INSTRUCTIONAL
  STATION IN A CAI SYSTEM. THE TRANSCEIVER AND THE
  CAI SYSTEM ARE HARD-WIRED TOGETHER TO FORM A SINGLE
  TRAINING SYSTEM. THE SYSTEM IS PRESENTLY OPERATING
  IN THE COMPUTER-BASED EDUCATION RESEARCH
  LABORATORY OF THE UNIVERSITY OF ILLINOIS. A
  STUDENT'S OPERATION OF SWITCHES ON THE TRANSCEIVER
  FRONT PANEL IS SENSED BY THE CAI SYSTEM. THE
  CAI SYSTEM CAN INSERT AND REMOVE MALFUNCTIONS IN
  THE TRANSCEIVER UNDER PROGRAM CONTROL. THIS ALLOWS
  PRACTICE IN OPERATING AND TROUBLESHOOTING THE
  EQUIPMENT TO BE COORDINATED WITH THE PRESENTATION OF
  TECHNICAL INFORMATION IN THE LESSONS. THE STUDENT
  IS REQUIRED TO PUT HIS KNOWLEDGE OF THIS INFORMATION
  TO IMMEDIATE USE IN SOLVING TROUBLESHOOTING PROBLEMS.
  THE REPORT DESCRIBES THE INITIAL IMPLEMENTATION OF
  THE ABOVE FEATURES. (AUTHOR)   (U)

NETWORK AND SWITCHING SYSTEMS THEORY

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0443

AD-255 842
  AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
  MASS
  MINIMAL SYNTHESIS OF THE WYE-FORM TWO-OUTPUT
  SWITCHING NETWORK   (U)
      JAN 61   IV   PETRICK,S.R.:
REPT. NO. 109
MONITOR: AFCRL   109

        UNCLASSIFIED REPORT

DESCRIPTORS: *SWITCHING CIRCUITS, CIRCUITS,
 COMPUTERS, ELECTRICAL NETWORKS, MATHEMATICAL ANALYSIS,
 SYNTHESIS   (U)

  THE PROBLEM TREATED IS THE SIMULTANEOUS
  MINIMIZATION OF THREE BOOLEAN FUNCTIONS X, Y, AND
  Z SUCH THAT IF F1 AND F2 ARE ANY TWO GIVEN
  BOOLEAN FUNCTIONS WE HAVE F1 = XY AND F2 =
  XZ. IN SWITCHINGCIRCUIT TERMINOLOGY THE PROBLEM
  CONSISTS OF SYNTHESIZING A MINIMAL WYE (Y) NETWORK
  TO REALIZE TWO ARBITRARY SWITCHING FUNCTIONS. BY
  REDUCING THE GIVEN TWO-OUTPUT PROBLEM TO AN
  EQUIVALENT SINGLE-OUTPUT PROBLEM, THE REQUIRED
  MINIMAL SYNTHESIS PROCEDURE IS FOUND FOR THE CASE
  WHERE EACH OF THE FUNCTIONS X, Y, AND Z IS
  RESTRICTED TO BE OF THE PRODUCT-OF-SUMS FORM.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 2E0463

AD-257 822
  SYRACUSE UNIV N Y
  TIME RESPONSE CHARACTERISTICS OF LINEAR NETWORKS AND
  TRANSFORMATION METHODS IN NETWORK SYNTHESIS   (U)
      MAY 61   IV   BRULE,JOHN D.ISH.H,B.P.!
REPT. NO. EE745 6157 2
CONTRACT: AF19 604 6142
MONITOR: AFCRL   186 V2

        UNCLASSIFIED REPORT

DESCRIPTORS: *ELECTRICAL NETWORKS, *OPTICAL
 EQUIPMENT, DIFFERENTIAL EQUATIONS, DIGITAL COMPUTERS,
 FUNCTIONS, LEAST SQUARES METHOD, MATHEMATICAL
 ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS, PROGRAMMING
 (COMPUTERS), SYNTHESIS. TAYLOR'S SERIES, TRANSIENTS,
 VECTOR ANALYSIS   (U)

   AN ATTEMPT HAS BEEN MADE TO USE THE CRITERION OF
 LEAST-SQUARED ERROR TO DETERMINE ANALYTICALLY THE
 SHIFTS OF THE LOCATION OF THE POLES AND RESIDUES OF
 A TRANSFER FUNCTION IN ORDER TO MEET A TIME DOMAIN
 SPECIFICATION. A FIRST APROXIMATION IS OBTAINED
 WITH THE HELP OF EXISTING METHODS, AND SUCCESSIVE
 STEPS ARE CARRIED OUT USING THE FIRST TWO TERMS OF
 THE TAYLOR SERIES EXPANSION OF THE FIRST
 APPROXIMATION. IN THE PROCESS, ORTHOGONAL VECTOR
 FUNCTIONS ARE FORMED BY LINEAR COMBINATIONS OF THE
 PARTIAL DERIVATIVE FUNCTIONS. THE USE OF FORTRAN
 FOR PROGRAMMING THE PROBLEM FOR THE IBM 650 DATA
 PROCESSING MACHINE IS ILLUSTRATED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-259 786
  REMINGTON RAND UNIVAC DIV SPERRY RAND CORP PHILADELPHIA
  PA
  MATHEMATICAL CIRCUIT ANALYSIS AND DESIGN   (U)
                  IV   BROWN,ALBERT;HULLS,L. ROBIN;
CONTRACT: AF19 604 5189
MONITOR: AFCRL   191

        UNCLASSIFIED REPORT

DESCRIPTORS: *CIRCUITS, *INVERTER CIRCUITS, DESIGN,
DIGITAL COMPUTERS, DIODES, INEQUALITIES, MATHEMATICAL
ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PARTIAL
DIFFERENTIAL EQUATIONS, PROGRAMMING (COMPUTERS),
RELAXATION OSCILLATORS, STATISTICAL ANALYSIS,
STATISTICAL DISTRIBUTIONS, TRANSISTORS   (U)

  MATHEMATICAL TECHNIQUES ARE APPLIED TO THE ANALYSIS
  OF THE STEADY-STATE PERFORMANCE OF A TRANSISTOR GATE-
  INVERTER CIRCUIT. THE STATISTICAL CALCULATION OF
  CIRCUIT BEHAVIOR IS DISCUSSED AND RESULTS ARE
  PRESENTED FOR THE COMPUTER ANALYSIS OF A TYPICAL
  CIRCUIT. A DETAILED MATHEMATICAL DESCRIPTION OF
  THE TECHNIQUE FOR DETERMINING THE MAXIMUM COMPONENT
  TOLERANCE IS INCLUDED AND THE SUBSEQUENT STATISTICAL
  STUDY INDICATES THE IMPORTANCE OF THE MAXIMUM
  TOLERANCE DETERMINATION IN CIRCUIT DESIGN.
  (AUTHOR)   (U)

AD-261 923
  POLYTECHNIC INST F BROOKLYN N Y MICROWAVE RESEARCH
  INST
  A NEW THEORY OF CASCADE SYNTHESIS   (U)
DESCRIPTIVE NOTE: RESEARCH REPT.
      MAY 61   40P   YOULA,D.C.+1
REPT. NO. PIBMRI-916-61
CONTRACT: AF19 604 4143
MONITOR: AFCRL 514

        UNCLASSIFIED REPORT

DESCRIPTORS: *CIRCUITS, *ELECTRIC FILTERS,
*ELECTRICAL NETWORKS, *RADIOFREQUENCY FILTERS, COMPLEX
VARIABLES, DIGITAL COMPUTERS, MATHEMATICAL ANALYSIS,
PROGRAMMING (COMPUTERS), SYNTHESIS   (U)

  A NEW RESULT IS PRESENTED GENERALIZING RICHARD'S
  THEOREM. IT IS THEN SHOWN THAT THIS RESULT LEADS
  TO A COMPLETE, SIMPLE AND UNIFIED THEORY OF CASCADE
  SYNTHESIS WHICH YIELDS THE TYPES A, B, BRUNE, C
  AND D SECTIONS IN A DIRECT AND NATURAL MANNER.
  THE ELEMENT VALUES OF THE VARIOUS SECTIONS ARE
  OBTAINED IN CLOSED FORM IN TERMS OF THREE OF SIX
  INDICES. THUS THE EXTRACTION CYCLE IS PERFORMED
  ONCE AND FOR ALL FOR THE WHOLE CLASS OF POSITIVE-REAL
  FUNCTIONS. SEVERAL PROBLEMS ARE WORKED OUT IN
  DETAIL AND A CHART IS CONSTRUCTED TO FACILITATE THE
  COMPUTATIONS. THE FORMULAS ARE EASILY PROGRAMMED
  ON A DIGITAL COMPUTER. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE04A3

AD-263 119
   SYRACUSE UNIV N Y
   TIME RESPONSE CHARACTERISTICS OF LINEAR NETWORKS AND
   TRANSFORMATION METHODS IN NETWORK SYNTHESIS   (U)
        AUG 61   IV   BRULE,JOHN D.;JOHNSON,RICHARD A.;
REPT. NO. EE745 6139F1
CONTRACT: AF19 604 6142
MONITOR: AFCRL   :86 P1

        UNCLASSIFIED REPORT

DESCRIPTORS: •CIRCUITS, •DATA PROCESSING SYSTEMS,
 •ELECTRICAL NETWORKS, •LINEAR SYSTEMS, ANALOG
 COMPUTERS, COMPUTER STORAGE DEVICES, DATA STORAGE
 SYSTEMS, ELECTRIC FILTERS, MATHEMATICAL PREDICTION,
 NUMERICAL ANALYSIS, POLYNOMIALS, SAMPLING, SYNTHESIS,
 TRANSFORMATIONS (MATHEMATICS)   (U)

   THE EFFECTS OF LINEAR NETWORKS ON VARIOUS TYPES OF
   SIGNALS, AND APPROXIMATION METHODS ARE CONSIDERED.
   A SYSTEMATIC MEANS IS DISCUSSED TO CHANGE A GIVEN
   RATIONAL TRANSFER FUNCTION SUCH THAT ITS IMPULSE
   RESPONSE APPROXIMATES A GIVEN TIME FUNCTION WITH
   REDUCED INTEGRAL SQUARED ERROR. TRANSFORMATION
   METHODS ARE PRESENTED THAT ARE OF USE IN NETWORK
   SYNTHESIS. IN MANY PROBLEMS OF INTEREST, A TIME
   DOMAIN REPRESENTATION OF THE NETWORKS UNDER
   CONSIDERATION MAY YIELD A BETTER INSIGHT INTO THE
   CHARACTERISTICS DESIRED THAN A FREQUENCY DOMAIN
   REPRESENTATION. FOR EXAMPLE, IN POLYNOMIAL
   EXTRAPOLATION OF SAMPLED DATA IT IS USEFUL TO
   CONSIDER THE EXTRAPOLATION PROCESS AS A FINITE MEMORY
   FILTER OPERATING ON THE INPUT DATA. THE OUTPUT OF
   THIS FILTER IS MOST READILY STUDIED BY CONSIDERING
   ITS TIME DOMAIN CHARACTERISTICS, RATHER THAN ITS
   FREQUENCY DOMAIN REPRESENTATION. THE TIME DOMAIN
   REPRESENTATION IS EXPLOITED HEREIN WHEN THE INPUT
   SIGNAL IS DETERMINISTIC, AND ALSO WHEN IT IS
   DESCRIBED IN TERMS OF AN AUTOCORRELATION FUNCTION.
   MUCH OF THE WORK THAT IS DONE IS CONCERNED WITH
   FINITE MEMORY FILTERS, AND A STUDY IN THE TIME DOMAIN
   IS FOUND TO BE MOST USEFUL IN THIS CASE.
   (AUTHOR)   (U)

AD-266 580
  NATIONAL BIOMEDICAL RESEARCH FOUNDATION SILVER SPRING
  MD
  COLLECTED PAPERS ON SWITCHING CIRCUIT THEORY AND
  LOGICAL AND SYSTEMS DESIGN   (U)
     OCT 61   IV   LEDLEY,ROBERT S.IBOYLE,DON R.I
  WILSON,JAMES B.I
CONTRACT: NONR326500

        UNCLASSIFIED REPORT

DESCRIPTORS: *DIGITAL SYSTEMS, *SWITCHING CIRCUITS,
 *SYNCHRONIZATION (ELECTRONICS), ALGEBRA, AUTOMATIC,
 CIRCUITS, COMPUTER LOGIC, COMPUTER STORAGE DEVICES,
 COMPUTERS, CYBERNETICS, DATA STORAGE SYSTEMS, DESIGN,
 DIGITAL COMPUTERS, ELECTRICAL NETWORKS, MATHEMATICAL
 LOGIC, MATRIX ALGEBRA, MEMORY, PROGRAMMING
 (COMPUTERS), PULSE COMMUNICATION SYSTEMS, SEQUENCES,
 TABLES, THEORY, TIME, TRANSFORMATIONS
 (MATHEMATICS)   (U)

  CONTENTS: BOOLEAN MATRICES APPLIED TO SEQUENTIAL
  CIRCUIT THEORY AND THRESHOLD LOGICS MULTIVALUED
  LOGIC DEVICES FOR SIMULATING THRESH OLD NEURONS
  ORGANIZATION OF LARGE MEMORY SYSTEMS AN
  ALGORITHM FOR RAPID BINARY DIVISION   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0443

AD-268 906
  DAVID SARNOFF RESEARCH CENTER PRINCETON N J
  MAJORITY LOGIC BY GEOMETRIC METHODS   (U)
      JUL 61   IV   MIILLER,H.S.;WINDER,R.O.;
REPT. NO. SR4
CONTRACT: AF19 604 8423
MONITOR: AFCRL   792

        UNCLASSIFIED REPORT

DESCRIPTORS: *ALGEBRAIC GEOMETRY; *COMPUTER LOGIC,
 *ELECTRICAL NETWORKS, COMPUTERS, FUNCTIONS, SWITCHING
 CIRCUITS, SYNTHESIS   (U)
 IDENTIFIERS: M-61 GUNS, 20-MM   (U)

  THE USEFULNESS OF A GEOMETRIC APPROACH TO THE
  FOLLOWING PROBLEM IS PRESENTED: GIVEN AN NARGUMENT
  SWITCHING FUNCTION AND I-INPUT MAJORITY GATES AS
  BUILDING BLOCKS, EVISE A NETWORK WHICH REPRE ENTS
  THE GIVEN FUNCTION. THIS PROBLEM HAS BEEN TREATED
  ALGEBRAICALLY. TWO-LEVEL REALIZATIONS WILL BE
  DERIVED, AND PROBLEMS WITH LARGER VALUES OF N AND ;
  ARE CONSIDERED. IN THESE CASES, MULTI-LEVEL
  REALIZATIONS MUST BE PERMITTED. THE SYNTHESIS
  PROCEDURES DESCRIBED EMPLOY GEOMETRIC INTUITION
  (NAMELY, MATCHING KNOWN PATTERNS WITH GIVEN
  PATTERNS), AND DO NOT GUARANTE OPTIMAL SOLUTIONS.
  (AUTHOR)   (U)

AD-273 849
  STANFORD UNIV CALIF STANFORD ELECTRONICS LABS
  OPERATOR METHODS FOR PIECEWISE-LINEAR NETWORK
  ANALYSIS   (U)
                    IV   ROTH,C.H.:

        UNCLASSIFIED REPORT

DESCRIPTORS: *CIRCUITS, *ELECTRICAL NETWORKS,
 *OPERATORS (MATHEMATICS), ANALYSIS, DIGITAL COMPUTERS,
 DIODES, ELECTRON TUBES, LINEAR SYSTEMS, MATHEMATICAL
 ANALYSIS, PROGRAMMING (COMPUTERS), THEORY,
 TRANSISTORS   (U)

   EFFORTS WERE MADE TO DEVELOP SYSTEMATIC METHODS FOR
   THE ANALYSIS OF NETWORKS THAT CONTAIN PIECEWISE-
   LINEAR (PWL) ELEMENTS. A GENERAL METHOD WAS
   DEVELOPED FOR ANALYSIS OF RESISTIVE PWL NETWORKS,
   AND SPECIAL CASES OF PWL NETWORKS CONTAINING
   REACTIVE ELEMENTS WERE SOLVED. AS A MORE
   SYSTEMATIC METHOD SUITABLE FOR USE WITH A DIGITAL
   COMPUTER, THE PWL-OPERATOR METHOD WAS DEVELOPED.
   PWL OPERATORS ARE DEFINED TO REPRESENT THE
   CHARACTERISTIC CURVES OF PWL ELEMENTS. THE BASIC
   ALGEBRAIC OPERATIONS ARE DEFINED FOR PWL OPERATORS
   AND THE ALGEBRAIC PROPERTIES ARE STUDIED. A NEW
   OPERATION IS INTRODUCED, WHICH SOLVES A CLASS OF
   PWL-OPERATOR EQUATIONS THAT CANNOT BE SOLVED IN
   TERMS OF THE BASIC ALGEBRAIC OPERATIONS. PWL-
   OPERATOR METHODS ARE APPLIED TO DETERMINE INPUT AND
   TRANSFER CHARACTERISTICS OF RESISTIVE PWL NETWORKS,
   AND THE ANALYSIS OF PWL TWO-PORTS IS CONSIDERED.
   PWL-OPERATOR METHODS ARE USED TO ANALYZE VACUUM-
   TUBE AND TRANSISTOR CIRCUITS. EXTENSION OF PWL-
   OPERATOR METHODS TO PWL NETWORKS THAT CONTAIN
   REACTIVE ELEMENTS IS CONSIDERED. COMPUTER PROGRAMS
   FOR THE ANALYSIS OF PWL NETWORKS ARE DISCUSSED.
   (AUTHOR)   (U)

AD-282 032
POLYTECHNIC INST OF BROOKLYN N Y MICROWAVE RESEARCH
INST
FURTHER CONTRIBUTIONS TO THE REALIZATION OF BOOLEAN
POLYNOMINALS BASED ON INCIDENCE MATRICES AND ITS
PROGRAMMING ON THE IBM 650 COMPUTER,   (U)
     AUG 61   49P   MORIWAKI,YOSHI I
REPT. NO. 938-61
CONTRACT: AF19 604 6620
PROJ: 5632
MONITOR: AFCRL   62 189

       UNCLASSIFIED REPORT

DESCRIPTORS: *ALGEBRAS, *DIGITAL COMPUTERS,
*ELECTRICAL NETWORKS, *MATRIX ALGEBRA, PROGRAMMING
(COMPUTERS), TABLES   (U)

THE MOST GENERAL PROCEDURE FOR FINDING MINIMUM CONTACT
SPRING NETWORKS IS DESCRIBED. THE PROGRAMMING OF THESE
PROCEDURES WITH THE AID OF AN IBM 650 COMPUTER IS
DISCUSSED.

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-282 248
  DAVID SARNOFF RESEARCH CENTER PRINCETON N J
  THEORY OF AJUSTABLE SWITCHING NETWORKS. I: A.
  THRESHOLD LOGIC. B. RELIABILITY OF SWITCHING NETWORKS
                                                    (U)
      APR 67   261P   AMAREL ,S. ILEVY ,S. I
  WINDER,R. O. I
REPT. NO.   55-1
CONTRACT: AF 19(604)-8423
PROJ: 4641
MONITOR: AFCRL   62-318

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: THIS REPORT INCLUDES: THEORETICAL
 CONSIDERATIONS ON RELIABILITY PROPERTIES OF RECURSIVE
 TRIANGULAR SWITCHING NETWORKS, BY S. AMAREL AND J.
 A. BRZOZOWSKI. 52P. INCL. ILLUS. 10 REFS. THE
 RELIABILITY OF RECURSIVE TRIANGULAR SWITCHING NETWORKS BUILT
 OF RECTIFIER GATES, BY SAUL LEVY. 54P. INCL. ILLUS. 3
 REFS.

DESCRIPTORS: •SWITCHING CIRCUITS, COMPUTER LOGIC,
 RELIABILITY, MATHEMATICAL ANALYSIS,
 COMPUTERS   (U)

  A DISCUSSION IS PRESENTED OF A DOUBLY INFINITE
  CHAIN OF PROPERTIES OF THRESHOLD FUNCTIONS, THE
  SECOND LIMIT OF WHICH CHARACTERIZES SUCH FUNCTIONS.
  THE FIRST TWO PROPERTIES, WHICH ARE THE MOST USEFUL
  AS NECESSARY CONDITIONS, ARE GIVEN SPECIAL ATTENTION:
  THEY YIELD INTERPRETATIONS IN ALGEBRAIC EXPRESSIONS
  FOR THE FUNCTION AND PROVIDE A NATURAL ORDERING OF
  THE FUNCTION'S ARGUMENTS. RELATIONS BETWEEN THE
  FAMILIES OF PROPERTIES ARE GIVEN, AND THEIR
  INDEPENDENCE SHOWN. SOME OTHER CONJECTURED
  CHARACTERIZATIONS OF THRESHOLD FUNCTIONS ARE SHOWN
  INVALID. THE NUMBER OF THRESHOLD FUNCTIONS, AS A
  FUNCTION OF N, IS GIVEN A RELATIVELY GOOD UPPER
  BOUND. (AUTHOR)   (M)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-282 27_
  LOCKHEED MISSILES AND SPACE CO SUNNYVALE CALIF
  INVESTIGATION OF THRESHOLD SWITCHING TECHNIQUES FOR
  DIGITAL COMPUTERS.   (U)
DESCRIPTIVE NOTE: FINAL REPT. 20 MAR 61-31 JAN 62.
    JUN 62   274P
REPT. NO. 2-01-62-1
CONTRACT: AF33 616 8035
PROJ: 7062
MONITOR: ASD   TDR62 308

        UNCLASSIFIED REPORT

DESCRIPTORS: •ELECTRICAL NETWORKS, •ELECTRONIC
 SWITCHES, •LINEAR SYSTEMS, COMPLEX VARIABLES, DESIGN,
 DIGITAL COMPUTERS, FUNCTIONS, MATHEMATICAL ANALYSIS,
 SIGNAL-TO-NOISE RATIC   (U)

  MAJOR EMPHASIS IS PLACED ON THEORETICAL ASPECTS OF
  THRESHOLD FUNCTIONS WITH PARTICULAR ATTENTION GIVEN
  TO SYNTHESIS METHODS FOR SPECIFYING NETWORKS OF
  THRESHOLD DEVICES. TECHNIQUES ARE PRESENTED FOR
  DETERMINING LINEAR SPEARABILITY AND FOR CALCULATING
  WEIGHTS AND THRESHOLD FOR THOSE FUNCTIONS WHICH ARE
  LINEARLY SEPARABLE. ALGORITHMS FOR PARTITIONING
  SWITCHING FUNCTIONS INTO SETS OF THRESHOLD FUNCTIONS
  ARE DESCRIBED AS WELL AS TE NIQUES FOR DECOMPOSING
  NETWORKS OF UNCONSTRAINED THRESHOLD DEVICES INTO
  NETWORKS OF DEVICES SATISFYING CERTAIN DESIGN
  CONSTRAINTS. SPECIAL CONSIDERATION IS GIVEN THE
  EFFECTS OF NOISE AND TOLERANCES IN SEVERAL TYPES OF
  CIRCUITS SUITABLE FOR THRESHOLD DEVICES WITH THE
  PRIMARY OBJECTIVE OF DETERMINING THE IMPORTANT DESIGN
  CONSTRAINTS. LOGICAL DESIGN EXAMPLES ARE PRESENTED
  TO DEMONSTRATE THE GENERAL UTILITY OF THRESHOLD
  FUNCTIONS. (AUTHOR)   (U)

AD-286 179
  REMINGTON RAND UNIVAC DI SPERRY RAND CORP PHILADELPHIA
  PA
  MATHEMATICAL CIRCUIT ANALYSIS AND DESIGN   (U)
                 IV   BROWN,ALBERT;MULLOCK,PHILIP J.;
REPT. NO. 62 317
CONTRACT: AF19 604 5189
MONITOR: AFCRL   62 317

        UNCLASSIFIED REPORT

DESCRIPTORS: ●CIRCUITS, ●DESIGN, ●INTEGRATION,
 ●MATHEMATICAL ANALYSIS, ●NUMERICAL METHODS AND
 PROCEDURES, ●STATISTICAL ANALYSIS, DIGITAL COMPUTERS,
 PARTIAL DIFFERENTIAL EQUATIONS, PROGRAMMING
 (COMPUTERS)   (U)

  A NUMBER OF NEW TECHNIQUES WERE INVESTIGATED FOR
  THE MATHEMATICAL ANALYSIS AND DESIGN OF ELECTRONIC
  CIRCUITS. THESE TECHNIQUES WERE TESTE ON SEVERAL
  NEW DEVICES, AND VARIANTS OF THE INVERTER CIRCUIT
  WERE EXAMINE IN MORE DETAIL. THE INVESTIGATIONS
  DESCRIBED ARE DIVIDED INTO TWO PARTS, STATISTICAL AND
  OTHER COMPUTATIONAL METHODS (PART II), AND
  ANALYTICAL STUDIES (PART III). (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE04A3

AD-287 061
  RAND CORP SANTA MONICA CALIF
  THE SYNTHESIS OF CASCADE SWITCHING CIRCUITS   (U)
              IV   LEVIEN, R.E. I

      UNCLASSIFIED REPORT

DESCRIPTORS: *DIGITAL COMPUTERS, *SWITCHING CIRCUITS,
 AUTOMATION, CIRCUITS, FUNCTIONS, MATHEMATICAL
 ANALYSIS, SIMULATION, SYNTHESIS   (U)

   THE PROBLEM IS CONSIDERED OF SYNTHESIZING SWITCHING
   CIRCUITS THAT COMPUTE A GIVEN, COMPLETELY SPECIFIED
   SWITCHING FUNCTION, AND A NEW POINT OF VIEW IS
   ADOPTED IN WHICH SWITCHING CIRCUITS ARE CONSIDERED TO
   BE REALIZATIONS OF ALGORITHMS RATHER THAN
   INTERPRETATIONS OF TRUTH-FUNCTIONAL FORMULAE. A
   RESTRICTED CLASS OF ALGORITHMS, CALLED THE CASCADE
   ALGORITHMS, IS IDENTIFIED: IT IS SUGGESTED THAT TREE
   AND COLLAPSED-TREE, ITERATIVE, MULTIPLE-ITERATIVE
   SEQUENTIAL, AND CASCADED-SEQUENTIAL SWITCHING
   CIRCUITS MAY BE VIEWED AS REALIZATIONS OF CASCADE
   ALGORITHMS. ALL OF THESE CIRCUITS ARE CALLED,
   THEREFORE, CASCADE CIRCUITS. THREE BASIC
   TECHNIQUES--FUNCTIONAL DECOMPOSITION, MERGING, AND
   SKIPPING-WHICH PERMIT THE SYNTHESIS OF EFFICIENT
   CASCADE ALGORITHMS TO COMPUTE A GIVEN FUNCTION, ARE
   DESCRIBED. IT IS THEN SHOWN HOW THESE TECHNIQUES
   MAY BE APPLIED SO AS TO SYNTHESIZE A COLLAPSEDTREE,
   ITERATIVE, MULTIPLE-ITERATIVE, SEQUENTIAL, OR
   CASCADED-SEQUENTIAL SWITCHING CIRCUIT THAT COMPUTES
   A GIVEN SWITCHING FUNCTION. EXAMPLES ARE DRAWN
   FROM THE TECHNOLOGY OF CURRENT-STEERING DEVICES,
   SUCH AS RELAYS AND CRYOTRONS, BUT THE METHOD IS
   APPLICABLE TO OTHER TECHNOLOGIES. THE PROCEDURES
   APPEAR TO BE WELL ADAPTED TO EXECUTION ON
   CONTEMPORARY DIGITAL COMPUTERS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-293 860
  AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
  MASS
  STUDIES IN THE THEORY OF SWITCHING CIRCUITS   (U)
              IV   SMITH,EDWARD J.I

      UNCLASSIFIED REPORT

DESCRIPTORS: *SWITCHING CIRCUITS, DIGITAL COMPUTERS,
  DIODES, ELECTRIC RELAYS, ELECTRICAL NETWORKS,
  MATHEMATICAL ANALYSIS, MATRIX ALGEBRA, TABLES,
  THEORY   (U)

  A SUMMARY OF A PROGRAM CONCERNED WITH VARIOUS
  PROBLEMS IN THE THEORY OF SWITCHING CIRCUITS IS
  GIVEN. SPECIFIC RESULTS INCLUDE: AN IMPROVED
  AMBIT METHOD FOR REALIZING CUT-SET MATRICES, THE
  DETECTION OF PARTIAL SYMMETRY IN BOOLEAN POLYNOMIALS,
  REALIZATION OF SYMMETRIC DIODE CIRCUITS, TREATMENT OF
  COMBINATIONAL RELAY-DIODE CIRCUITS BY MATRIX AND
  GRAPH THEORETIC METHODS, AND AN IMPROVEMENT IN AN
  ESTABLISHED TECHNIQUE FOR MINIMIZING THE INTERNAL
  STATES IN AN INCOMPLETELY SPECIFIED SEQUENTIAL
  MACHINE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0443

AD-296 990
  CASE INST OF TECH CLEVELAND OHIO
  THE SYNTHESIS OF MINIMUM SENSITIVITY NETWORKS   (U)
       JAN   63   IV   SCHOEFFLER,JAMES D.·WAREN,A.D.·I
REPT. NO. TR6
CONTRACT: NONR114110

        UNCLASSIFIED REPORT

DESCRIPTORS: *ELECTRICAL NETWORKS, COMPUTERS, DESIGN,
 DIFFERENTIAL EQUATIONS, NETWORKS, SENSITIVITY,
 SYNTHESIS   (U)

  THE SYNTHESIS OF NETWORKS WITH MINIMUM SENSITIVITY
  TO ELEMENT TOLERANCES IS STUDIED FROM A COMPUTER
  VIEWPOINT. THE THEORY OF EQUIVALENT NETWORKS IS
  USED TO GENERATE A SEQUENCE OF NETWORKS WHOSE
  TRANSFER FUNCTIONS ARE IDENTICAL TO THAT OF A GIVEN
  NETWORK BUT WHOSE ELEMENTS DIFFER FROM ONE NETWORK TO
  THE NEXT BY AN INCREMENTAL AMOUNT. IN THE LIMIT,
  DIFFERENTIAL EQUATIONS RESULT WHOSE SOLUTION AT ANY
  VALUE OF THE INDEPENDENT VARIABLE GIVE THE ELEMENTS
  OF AN EQUIVALENT NETWORK. SIMILARLY, DIFFERENTIAL
  EQUATIONS FOR THE SENSITIVITY OF THE TRANSFER
  FUNCTION TO CHANGES IN EACH OF THE ELEMENTS ARE
  DERIVED. THE DIFFERENTIAL EQUATIONS IN BOTH CASES
  ARE LINEAR HOMOGENEOUS WITH THE ELEMENTS OF THE
  TRANSFORMATION MATRIX AS THE FORCING FUNCTIONS.
  WITH THE AID OF THE EXPONENTIAL SOLUTION TO THE
  MATRIX DIFFERENTIAL EQUATION, DIGITAL COMPUTER
  SOLUTION EVEN FOR COMPLEX NETWORKS IS VERY
  STRAIGHTFORWARD AND RAPID. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-418 163
  ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
  AN ALGORITHM FOR THE SYNTHESIS OF LARGE SE QUENTIAL
  SWITCHING CIRCUITS;   (U)
      MAY 63   49P   ELSEY,JOHN I
REPT. NO. R169
CONTRACT: DA36 039AMC02208
PROJ: DA PROJ. 3A99 25 004

        UNCLASSIFIED REPORT

DESCRIPTORS: (*SWITCHING CIRCUITS, SYNTHESIS),
  (*NUMERICAL METHODS AND PROCEDURES, SYNTHESIS),
  DIGITAL COMPUTER, PROGRAMMING (COMPUTERS),
  FUNCTIONS, COMPUTER STORAGE DEVICES, MATHE
  MATICAL MODELS, FEEDBACK, SEQUENCE SWITCHES,
  CONTROL SEQUENCES, CODING, SYNCHRONIZATION,
  MATRIX ALGEBRA, EQUATIONS, COMPUTER LOGIC,
  COMBINATORIAL ANALYSIS, TABLES.   (U)
IDENTIFIERS: ALGORITHM, 1963.   (U)

   WITH THE DEVELOPMENT AND WIDESPREAD USE OF LARGE
   DIGITAL COMPUTERS, WHICH ARE SWITCHING CIRCUITS,
   THERE HAS BEEN AN INCREASING INTEREST IN SWITCH ING
   CIRCUIT THEORY. MUCH EFFORT HAS BEEN SPENT IN
   DESIGNING OR SYNTHESIZING SWITCHING CIRCUITS, BUT
   UNFORTUNATELY MANY OF THE PROCEDURES NOW IN USE ARE
   MORE OF AN ART THAN A SCIENCE IN THAT MUCH INSIGHT
   AND EXPERIENCE ARE USUALLY REQUIRED ON THE PART OF
   THE DESIGNER. SOME SYSTEMATIC DE SIGN METHODS HAVE
   BEEN INTRODUCED BUT THESE ARE ONLY APPLICABLE TO
   RATHER SMALL CIRCUITS. THIS THESIS DEVELOPS AND
   PRESENTS AN ALGORITHM FOR SYNTHESIZING ASYNCHRONOUS
   SEQUENTIAL SWITCHING CIRCUITS. THE ALGORITHM HAS
   CERTAIN PROPERTIES WHICH MAKE IT USEFUL AND
   APPLICABLE TO LARGE SWITCHING CIRCUITS SUCH AS THE
   CONTROL UNIT OF A DIGITAL COMPUTER. THE STEPS IN
   THE ALGORITHM ARE SYSTEMATIC AND SIMPLE PERMITTING A
   SOLUTION TO BE OBTAINED IN A RELATIVELY SHORT AMOUNT
   OF TIME. THE RESULTING DESIGN IS NOT OPTIMUM IN
   THAT THE CIRCUIT HAS THE MINIMUM NUMBER OF STATES OR
   MINIMUM AMOUNT OF LOGIC. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-429 351
  RAND CORP SANTA MONICA CALIF
  CHALLENGES OF MODERN CONTROL THEORY,   (U)
      JAN 64   7P   BELLMAN,RICHARD !
REPT. NO. RM3956PR
CONTRACT: AF49 638 700

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CONTROL SYSTEMS, MATHEMATICAL MODELS),
 THEORY, NUMERICAL ANALYSIS, BIOLOGY, MEDICINE,
 COMPUTERS, TEACHING MACHINES, ALGEBRA, ALGEBRAIC
 TOPOLOGY, CYBERNETICS, NERVOUS SYSTEM, BRAIN,
 PROSTHETICS, DEAFNESS, BLINDNESS, CANCER, HEART,
 MENTAL DISORDERS   (U)
IDENTIFIERS: 1964, DYNAMMIC PROGRAMMING, CONTROL
 THEORY, EMBEDDING   (U)

   THE FUNDAMENTAL OBJECTIVE OF THE NEW SCIENTIFIC
   DISCIPLINE CALLED 'CONTROL THEORY' IS THAT OF
   MODIFYING THE BEHAVIOR OF A SYSTEM SUBJECT TO
   VARIOUS CONSTRAINTS OF FEASIBILITY SO AS TO ACHIEVE
   DESIRED AIMS. FROM THE MATHEMATICAL POINT OF
   VIEW, THE PRIME PURPOSE IS TO APPROXIMATE TO REALITY
   BY MEANS OF HIERARCHIES OF MATHEMATICAL MODELS, EACH
   REPRESENTING A PROJECTION OF THE SCIENTIFIC SCENE.
   SOME ASPECTS OF THIS ATTITUDE ARE DISCUSSED AND THE
   POSSIBLE CONTRIBUTIONS OF MODERN CONTROL THEORY TO
   THE BIOMEDICAL DOMAIN ARE BRIEFLY INDICATED.
   (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-430 819
  PARKE MATHEMATICAL LABS INC CARLISLE MASS
  A MATHEMATICAL MODEL FOR INPUT-OUTPUT DEVICES AND
  THEIR CONNECTIONS,   (U)
    NOV 63   62P   CALABI,L. IRILEY,J. A. I
REPT. NO. SR5
CONTRACT: AF19 628 2417
PROJ: 4608
TASK: 460805
MONITOR: AFCRL   64 4

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INPUT-OUTPUT DEVICES, MATHEMATICAL
 MODELS), (*COMPUTER LOGIC, THEORY), COMPUTER STORAGE
 DEVICES, COMPUTERS, SWITCHING CIRCUITS, CONTROL
 SYSTEMS, SEQUENCES, ALGEBRAS, FUNCTIONS, OPERATORS
 (MATHEMATICS), MATHEMATICAL LOGIC, GROUPS
 (MATHEMATICS), PULSE ANALYZERS, CIRCUITS   (U)
IDENTIFIERS: 1963, ABSTRACT ALGEBRA, BANG-BANG
 CONTROL   (U)

  CONTENTS: INTUITIVE DISCUSSION - SWITCHES,
  SERIES AND PARALLEL CONNECTIONS! CONTROL
  CONNECTION, INPUT CONTRACTION, EVALUATION!
  MULTIPLE-OUTPUT DEVICES! FORMAL THEORY -
  OPERATIONS ON SEQUENCES! THE SUBSTITUTION
  ALGEBRA OF FUNCTIONS! SUBSTITUTION ALGEBRAS
  OF DEVICES! AND SUBALGEBRAS! HOMOMORPHISMS!
  COMPLETENESS.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-601 197
   ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
   APPLICATION OF LINEAR GRAPHS TO ELECTRICAL NETWORKS,
   SWITCHING NETWORKS AND COMMUNICATION NETS.   (U)
      APR 64   150P   MAYEDA,W. I
REPT. NO. R203
CONTRACT: DA36 039AMC02208E
PROJ: 3A99 25 004

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NETWORKS, GRAPHICS), (*TOPOLOGY,
LINEAR SYSTEMS), ELECTRICAL NETWORKS, SWITCHING
CIRCUITS, COMMUNICATION SYSTEMS, MATRIX ALGEBRA,
DIGITAL COMPUTERS, PROGRAMING (COMPUTERS)   (U)

   THIS PAPER IS DIVIDED INTO THREE PARTS: THE
   FIRST PART SHOWS HOW LINEAR GRAPHS ARE USED IN
   ANALYSIS OF ELECTRICAL NETWORKS. THE PROOF FOR THE
   TOPOLOGICAL FORMULAS OF TRANSFER FUNCTIONS OF PASSIVE
   NETWORKS WITHOUT MUTUAL COUPLINGS GIVEN HERE IS THE
   FIRST FORMAL AND PRECISE PROOF IN THIS FIELD. BY
   THE USE OF TOPOLOGICAL FORMULAS, SUCH A PASSIVE
   NETWORK CAN BE ANALYZED BY A DIGITAL COMPUTER. THE
   SECOND PART DISCUSSES THE APPLICATION OF LINEAR
   GRAPHS TO SWITCHING NETWORKS BY STARTING WITH
   EXPLORATION OF THE PROPERTIES OF PATHS IN A LINEAR
   GRAPH. THEN THE NECESSITY OF REALIZING A CUT SET
   MATRIX (OR CIRCUIT MATRIX) IS DISCUSSED. THE
   THIRD PART DISCUSSES A RATHER NEW FIELD WHICH IS
   MANY-PORTS FLOW PROBLEMS WHICH IS CALLED THE THEORY
   OF COMMUNICATION NETS.   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO: ZE0463

AD-604 046
  RENSSELAER POLYTECHNIC INST TROY N Y
  PHYSICAL PHENOMENA FOR LOGICAL FUNCTIONS.   (U)
DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,
      FEB 64   76P   BEAM,WALTER R. :
CONTRACT: AF AFOSR62 194
MONITOR: AFOSR ,   64 1379

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER LOGIC, SEMICONDUCTOR
 DEVICES), (*SEMICONDUCTOR DEVICES, COMPUTER LOGIC),
 DIGITAL COMPUTERS, NEURISTORS, THIN FILMS (STORAGE
 DEVICES), NIOBIUM ALLOYS, OXIDES, COMPUTER STORAGE
 DEVICES, TOPOLOGY, POWER SUPPLIES, RELIABILITY
 (ELECTRONICS), FEASIBILITY STUDIES   (U)
IDENTIFIERS: THIN FILMS, THIN FILMS
 ELECTRONICS   (M)

  THERE ARE A NUMBER OF PHYSICAL PHENOMENA OCCURRING
  IN SOLIDS WHICH HAVE SOME PROMISE FOR APPLICATION TO
  LOGICAL DEVICES. SOME OF THESE HAVE BEEN PARTIALLY
  EXPLORED AND AT LEAST FOR THE PRESENT, DISCARDED.
  OTHERS HAVE RECEIVED NO CONSIDERATION, NOT EVEN A
  FEASIBILITY EVALUATION. THE PURPOSE OF THIS WORK
  IS TO CONSIDER SOME OF THESE PHENOMENA TO DISCOVER IN
  WHAT FORM AND HOW WELL THEY MIGHT BE USED TO
  CONSTRUCT DEVICES AND IMPLEMENT USEFUL LOGICAL
  FUNCTIONS. TECHNICAL STUDY AREAS INCLUDE:
  DISTRIBUTED CONSTANT NEURISTORS, NIOBIUM OXIDE
  NEGATIVE RESISTANCE ELEMENTS, MINIMUM COMPLEXITY
  DIGITAL ELECTRONICS, CONTINUOUS-MEDIUM DOMAIN LOGIC
  AND MEMORY DEVICES, AND SOME REMARKS ON TOPOLOGY AND
  POWER SUPPLY OF LOGICAL NETWORKS.   (U)

132

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-607 228
  PRINCETON UNIV N J DIGITAL SYSTEMS LAB
  IMPLICATION TECHNIQUES FOR BOOLEAN FUNCTIONS.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.
     AUG 64   9P   GAINES,R. S. :
REPT. NO. PU-DSL-39

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPPORTED IN PART BY THE BELL
 TELEPHONE LABS., MURRAY HILL, N. J. PREPARED FOR
 PRESENTATION AT THE ANNUAL SYMPOSIUM (5TH) ON
 SWITCHING CIRCUIT THEORY AND LOGICAL DESIGN,
 PRINCETON, N. J., NOV 11-12, 13, 1964.

DESCRIPTORS: (*SPECIAL FUNCTIONS (MATHEMATICAL),
 COMPUTER LOGIC), (*COMPUTER LOGIC, SPECIAL FUNCTIONS,
 MATHEMATICAL)), SWITCHING CIRCUITS, MATHEMATICAL
 LOGIC, NUMERICAL ANALYSIS, PRIME NUMBERS, MATRIX
 ALGEBRA, CIRCUITS, COMPUTERS   (U)
IDENTIFIERS: PRIME IMPLICANTS   (U)

  THIS PAPER PRESENTED SEVERAL USES OF THE LOGICAL
  CONNECTIVE OF IMPLICATION TO PROBLEMS OF INTEREST IN
  SWITCH ING THEORY. THE IMPLICATIONS WHICH HOLD
  AMONG THE PRIME IMPLICANTS OF A FUNCTION WERE
  EXAMINED. A NEW SET OF NECESSARY AND SUFFICIENT
  CONDITIONS FOR DETERMINING ESSENTIAL PRIME IMPLICANTS
  AND A RAPID APPROXIMATE METHOD FOR OBTAINING MINIMAL
  SUMS WERE INCLUDED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-607 476
  CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB
  ANALYSIS OF LINEAR SEQUENTIAL CIRCUITS BY CONFLUENCE
  SETS,   (U)
    JUN 64   15P   GILL,ARTHUR I
REPT. NO. ERL-64-30
CONTRACT: NONR222 53

       UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPRINTED FROM IEEE TRANSACTIONS ON
 ELECTRONIC COMPUTERS, VOLUME EC-13:226-231, NO.3,
 JUN 64.

DESCRIPTORS: (*CIRCUITS, SEQUENCES), (*SET THEORY,
 CIRCUITS), LINEAR SYSTEMS, ANALYSIS, SWITCHING
 CIRCUITS, GROUPS (MATHEMATICS), TOPOLOGY, GRAPHICS,
 COMPUTERS, NETWORKS, TRANSIENTS   (U)

  IN THIS PAPER THE GROUP-THEORETICAL CONCEPT OF
  'CONFLUENCE SETS' IS INTRODUCED AS A VALUABLE
  TOOL IN THE ANALYSIS OF LINEAR SEQUENTIAL CIRCUITS
  (LSC'S). USING THIS CONCEPT, A SCHEME IS
  FORMULATED FOR PRODUCING STATE GRAPH OF AUTONOMOUS
  LSC'S WHICH, IN THE 'SINGULAR' CASE, IS
  SUPERIOR TO CURRENTLY KNOWN SCHEMES. SINGULAR
  LSC'S, WHICH ARE OF POTENTIAL INTEREST IN ERROR
  CORRECTION SYSTEMS, ARE STUDIED IN DETAIL.
  PROPERTIES OF THEIR STATE GRAPHS ARE DERIVED,
  CULMINATING IN A UNIQUE CHARACTERIZATION OF SUCH
  GRAPHS IN TERMS OF REPRESENTATIVE 'CYCLES' AND
  'TREES'. TOGETHER WITH KNOWN RESULTS ON
  NONSINGULAR CIRCUITS, THE RESULTS IN THIS PAPER OFFER
  A DESCRIPTION OF THE AUTONOMOUS BEHAVIOR OF THE
  GENERAL LINEAR SEQUENTIAL CIRCUIT. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-608 881
  MASSACHUSETTS INST OF TECH CAMBRIDGE ELECTRONIC SYSTEMS
  LAB
  SYNTHESIS OF SEQUENTIAL SWITCHING NETWORKS.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
      OCT 64   174P   SUSSKIND,A. K. IHARING,D. R. I
  LIU,C. L. IMENGER,K. S. I
REPT. NO. ESL-FR-216
CONTRACT: AF33 657 11677
PROJ: DSR9800 ,5581
TASK: 7062
MONITOR: RADC ,   TDR64 492

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•SWITCHING CIRCUITS, SYNTHESIS),
 (•NETWORKS, COMPUTER LOGIC), INPUT-OUTPUT DEVICES:
 SEQUENCE SWITCHES, ITERATIVE METHODS, CIRCUITS,
 COMPUTERS, COMPUTER STORAGE DEVICES, THEOREMS,
 COMBINATORIAL ANALYSIS, PERMUTATIONS, ALGEBRA   (U)

  THIS REPORT PRESENTS RESULTS OF STUDIES IN THE
  SYNTHESIS OF SEQUENTIAL SWITCHING NETWORKS. TOPICS
  COVERED ARE THE SYNTHESIS OF PERMUTATION MACHINES
  WITH THRESHOLD ELEMENTS, IN PARTICULAR ONE THRESHOLD
  ELEMENT PER MEMORY ELEMENT: A METHOD OF SYNTHESIS IN
  WHICH THE COMBINATIONAL LOGIC OF ANY SEQUENTIAL
  CIRCUIT MAY BE REALIZED BY MEANS OF A CASCADED
  ARRANGEMENT OF S-INPUT, S-OUTPUT LOGIC BLOCKS
  (S DENOTES NUMBER OF STATE VARIABLES). THAT
  APPROACH HAS APPLICABILITY IN INTEGRATED CIRCUIT
  REALIZATION OF COMPUTERS. OTHER TOPICS ARE IN THE
  SYNTHESIS OF SEQUENTIAL SWITCHING CIRCUITS IN SHIFT-
  REGISTER FORM. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-610 149
  ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
  GENERATION OF DIRECTED TREES, 2-TREES AND PATHS
  WITHOUT DUPLICATION,   (U)
      JAN 65   49P   PAUL,ARCHIE JOSEPH ,JR.I
REPT. NO. CSL-R-241
CONTRACT: DA28 043AMC00073E
MONITOR: AFOSR   65-0259

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*TOPOLOGY, NETWORKS), (*NETWORKS,
 TOPOLOGY), SWITCHING CIRCUITS, ELECTRICAL NETWORKS,
 DIGITAL COMPUTERS, CIRCUITS, COMMUNICATION SYSTEMS,
 SET THEORY, GRAPHICS   (U)

  THE INCREASING NUMBER OF APPLICATIONS OF GRAPH
  THEORY TO THE SOLUTION OF PROBLEMS IN MANY FIELDS
  MAKE IT DESIRABLE TO HAVE AVAILABLE COMPLETE
  KNOWLEDGE OF THE PROPERTIES OF THESE GRAPHS. SINCE
  MANY PROBLEMS IN ELECTRICAL NETWORKS, SWITCHING
  CIRCUITS, AND COMMUNICATION NETS CAN BE FORMULATED IN
  TERMS OF DIRECTED GRAPHS, IT IS APPROPRIATE TO STUDY
  THEIR PROPERTIES. IN THIS PAPER, PROCEDURES ARE
  DEVELOPED FOR GENERATING THE DIRECTED TREES, 2-TREES
  AND PATHS OF A DIRECTED GRAPH. UNLIKE OTHER
  METHODS FOR GENERATING THESE SUBGRAPHS, THE
  PROCEDURES DEVELOPED HERE AVOID GENERATING DUPLICATE
  ELEMENTS THUS THEY ELIMINATE THE NECESSITY OF
  REPEATED SEARCH TO SELECT A COMPLETE SET OF ELEMENTS.
  PROOFS ARE GIVEN TO VERIFY THAT ALL ELEMENTS OF THE
  SET OF DIRECTED TREES, 2-TREES OR PATHS ARE GENERATED
  AND THAT NO DUPLICATE ELEMENTS OCCUR. EXAMPLES ARE
  GIVEN TO ILLUSTRATE THE PROCEDURES IN DETAIL. THE
  PROCEDURES ARE AMENABLE TO DIGITAL COMPUTER
  APPLICATION. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-610 771
   AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHOOL OF
   ENGINEERING
   OPTIMIZING THE ASSIGNMENT PROBLEM IN THE SYNTHESIS OF
   SEQUENTIAL MACHINES.   (U)
DESCRIPTIVE NOTE: MASTER'S THESIS,
      AUG   64   103P   HALSEY,JESSE W. I
REPT. NO.   GRE/MATH/64 15

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*LINEAR PROGRAMMING, OPTIMIZATION),
 (*OPERATIONS RESEARCH, SWITCHING CIRCUITS),
 (*SWITCHING CIRCUITS, SYNTHESIS), COMPUTER LOGIC,
 NETWORKS, INPUTOUTPUT DEVICES, COMBINATORIAL ANALYSIS,
 ALGEBRA, CODING, DIGITAL COMPUTERS   (U)
IDENTIFIERS: ASSIGNMENT PROBLEM, SEQUENTIAL MACHINES,
 BINARY CODING   (U)

   A PROCEDURE FOR ASSIGNING BINARY CODES TO THE
   INPUTS OF A SEQUENTIAL MACHINE IS EXAMINED IN AN
   ATTEMPT TO MECHANIZE THE PROCEDURE USING LINEAR
   PROGRAMMING. REASONS ARE GIVEN FOR THE DIFFICULTY
   INVOLVED IN ATTEMPTING TO DERIVE LINEAR CONSTRAINING
   EQUATIONS FOR AN OBJECTIVE FUNCTION SPECIFIED BY THE
   PROCEDURE. IN THE SECOND PART OF THIS THESIS, THE
   PARTITION-PAIR ON THE SET OF STATES OF A SEQUENTIAL
   MACHINE IS EXTENDED TO THE INPUTS OF A SEQUENTIAL
   MACHINE IN AN EFFORT TO SIMPLIFY THE LOGICAL
   EQUATIONS. IT IS SHOWN THAT INPUT-STATE PAIRS ARE
   EFFECTIVE IN OBTAINING THE SIMPLIFICATION OF THESE
   LOGICAL EQUATIONS. (AUTHOR)   (U)

AD-612 642
  POLYTECHNIC INST OF BROOKLYN N Y MICROWAVE RESEARCH
  INST
  SINGULAR LINEAR SEQUENTIAL MACHINES: SOME FURTHER
  GROUP PROPERTIES AND CANONICAL FORM REALIZATIONS,   (U)
     OCT 64   20P   LAVALLEE,PIERRE J
REPT. NO. PIBMRI-1250-64
CONTRACT: AF49 638 1402

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CIRCUITS, SEQUENCES), (*SET THEORY,
 CIRCUITS), LINEAR SYSTEMS, ANALYSIS, SWITCHING
 CIRCUITS, GROUPS (MATHEMATICS), TOPOLOGY, GRAPHICS,
 COMPUTERS, NETWORKS, TRANSIENTS   (U)
IDENTIFIERS: SHIFT REGISTERS   (U)

  SINGULAR AUTONOMOUS LINEAR SEQUENTIAL MACHINES ARE
  ANALYZED FOLLOWING SIMPLE GROUP PROPERTIES INTRODUCED
  BY GILL +IEEE TRANSACTIONS ON ELECTRONIC
  COMPUTERS, VOL. EC-13: 226-231, NO. 3, JUN
  1964, AD-607 476). IT IS SHOWN THAT THE SET OF
  JUNCTION STATES FOR THE CONFLUENCE SETS FORM A GROUP,
  WITH AS NORMAL SUBGROUP, THE SETS OF STATES ON THE
  CYCLE SETS. THE SET OF STATES MAPPING INTO THE
  NULL (0) STATE ALSO FORMS A GROUP CALLED THE NULL
  TREE GROUP. THE CYCLE SET GROUP AND THE NULL TREE
  GROUP ARE REALIZED SEPARATELY AND THE DIRECT SUM OF
  THESE TWO GROUPS COMPLETELY CHARACTERIZES THE
  OPERATION OF THE MACHINE. THE NULL TREE IS SHOWN
  TO BE CHARACTERIZED BY A SET OF M DISJOINT PATHS:
  TO EACH OF THESE PATHS THERE CORRESPONDS A SHIFT
  REGISTER HAVING AS MANY DELAY ELEMENTS AS THERE ARE
  STATES IN THAT PATH. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-619 806
  AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
  MASS
  STATE-LOGIC RELATIONS IN AN ITERATIVE STRUCTURE FOR
  AUTONOMOUS SEQUENTIAL MACHINE.   (U)
DESCRIPTIVE NOTE: PHYSICAL AND MATHEMATICAL SCIENCES
  RESEARCH PAPERS,
    JUN 65   24P   KING,WILLIAM F. ,III.I
REPT. NO. AFCRL-65-439 ,PMSRP-112
PROJ: 4641
TASK: 464104

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMPUTER LOGIC, SWITCHING
  CIRCUITS), (*ITERATIVE METHODS, COMPUTERS),
  MICROMINIATURIZATION(ELECTRONICS), AUTOMATA,
  SYNTHESIS, NETWORKS   (U)
IDENTIFIERS: SEQUENTIAL MACHINES   (U)

  THE STATE-LOGIC RELATIONS ARE DETERMINED IN AN
  ITERATIVE STRUCTURE FOR ANY AUTONOMOUS SEQUENTIAL
  MACHINE. A MODEL (UNLIKE THAT OF MEALY) IS
  USED IN WHICH DELAY IS DISTRIBUTED THROUGHOUT THE
  MACHINE. THEOREMS ARE PRESENTED WHICH PRESCRIBE
  THE INTERCONNECTION OF IDENTICAL ELEMENTS TO REALIZE
  ANY AUTONOMOUS SEQUENTIAL BEHAVIOR. SYNTHESIS, AS
  DESCRIBED HERE, YIELDS A MORE COSTLY MACHINE IN TERMS
  OF DELAY ELEMENTS THAN THOSE OF PREVIOUS WORKERS.
  IN ADDITION TO THE ITERATIVE STRUCTURE, INCREASED
  SPEED OF OPERATION IS THE ADVANTAGE SOUGHT BY THE
  EXTRA DELAY ELEMENTS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-625 201   9/1   12/1
  ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
  ELEMENTARY COMPLETE TREE TRANSFORMATION,   (U)
      DEC 65   24P   MAYEDA,WATARU :
REPT. NO. R-272
CONTRACT: DA-28-043-AMC-00073 GRANT ,AF-AFOSR-931-
 65
PROJ: DA-20014501B31F
MONITOR: AFOSR   66-0496

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*NETWORKS, TOPOLOGY), (*TOPOLOGY,
 NETWORKS), (*TRANSFORMATIONS(MATHEMATICS),
 TOPOLOGY), COMMUNICATION SYSTEMS, ELECTRICAL
 NETWORKS, SET THEORY, DIGITAL COMPUTERS,
 GRAPHICS   (U)

  IT IS KNOWN THAT A PASSIVE ELECTRICAL NETWORK
  WITHOUT MUTUAL COUPLINGS CAN BE ANALYZED BY KNOWNING
  ALL POSSIBLE TREES OF A LINEAR GRAPH CORRESPONDING TO
  THE NETWORK. SINCE THERE EXISTS A REASONABLY
  SIMPLE METHOD OF GENERATING ALL POSSIBLE TREES OF A
  LINEAR GRAPH WITHOUT DUPLICATIONS, ANALYSIS OF SUCH A
  NETWORK BY A COMPUTER BECOMES SIMPLE. WHEN A PAIR
  OF LINEAR GRAPHS IS USED, AN ACTIVE NETWORK CAN BE
  ANALYZED BY KNOWING ALL POSSIBLE COMPLETE TREES EACH
  OF WHICH IS A TREE OF BOTH LINEAR GRAPHS. AT
  PRESENT THERE IS NO SIMPLE METHOD F GENERATING ALL
  POSSIBLE COMPLETE TREES WITHOUT DUPLICATIONS.
  HENCE, IN ORDER TO OBTAIN ALL POSSIBLE COMPLETE
  TREES BY A COMPUTER, ONE OF THE BEST AVAILABLE
  METHODS AT PRESENT IS TO GENERATE ALL POSSIBLE TREES
  OF EACH LINEAR GRAPH TO OBTAIN TWO COLLECTIONS OF
  TREES, THEN INTERSECTING THE TWO COLLECTIONS. IT
  IS NOT DIFFICULT TO DESIGN AN ACTIVE NETWORK SUCH
  THAT THERE ARE MORE THAN A THOUSAND OF TREES IN EACH
  OF A PAIR OF LINEAR GRAPHS CORRESPONDING TO THE NET,
  BUT THERE ARE LESS THAN ONE HUNDRED COMPLETE TREES.
  HENCE TO OBTAIN A SIMPLE METHOD OF GENERATING ALL
  POSSIBLE COMPLETE TREES IS UNDOUBTEDLY IMPORTANT FOR
  ANALYSIS OF ACTIVE NETWORKS BY A COMPUTER.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-631 657   9/2   9/5
  ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
  COMPUTER-AIDED ANALYSIS OF A SILICON MONOLITHIC
  INTEGRATED CURRENT SWITCH GATE.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
      MAR   66   26P   BELL,WILLIAM V. ;
  KERNAN,JOSEPH E. ,JR.;HOLUB,PAUL H. ;
REPT. NO. ECOM-2683;
PROJ: DA-1L0-13901-A91A,
TASK: 1L0-13901-A91A-0035,

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SWITCHING CIRCUITS, *COMPUTER
 LOGIC), (*INTEGRATED CIRCUITS, COMPUTER LOGIC),
 (*GATES(CIRCUITS), INTEGRATED CIRCUITS),
 SILICON, CIRCUITS, ELECTRICAL PROPERTIES,
 SYNTHESIS, PROGRAMMING(COMPUTERS), DIGITAL
 COMPUTERS, NOISE, REDUCTION   (U)

  IN THE D.C. DESIGN OF LARGE SIGNAL NON-SATURATING-
  TYPE LOGIC CIRCUITS, IT HAS BEEN POSSIBLE TO DEVELOP
  A SET OF WORST CASE DEFINING EQUATIONS WHICH TAKE
  INTO ACCOUNT ALL EXTERNAL AND INTERNAL PARAMETER
  VARIATIONS; SUCH AS RESISTOR, VOLTAGE TOLERANCES AND
  CERTAIN TRANSISTOR PARAMETERS. AN EXAMPLE OF HOW A
  COMPUTER SOLVES THE PROBLEM OF SPECIFYING ALLOWABLE
  NOISE IMMUNITY OF A CURRENT SWITCH GATE (C.S.G.)
  UNDER WORST CASE STATIC CONDITIONS IS ILLUSTRATED IN
  THIS REPORT. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 2ED463

AD-640 457   9/5   9/2
  ILLINOIS UNIV URBANA COORDINATED SCIENCE LAB
  MATRIX SWITCHES AND ERROR CORRECTING CODES FROM BLOCK
  DESIGNS,   (U)
     AUG 66   48P   BAHL,LALIT RAI :
REPT. NO. R-314,
CONTRACT: DA-28-043-AMC-00073(E),NSF-GK-690
PROJ: DA-20014501831F,

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*SWITCHING CIRCUITS, *MAGNETIC CORE
 STORAGE), ERRORS, COMPUTERS, CODING, DESIGN,
 MATRIX ALGEBRA, CORRECTIONS, COMBINATORIAL
 ANALYSIS   (U)

  METHODS OF OBTAINING MATRIX SWITCHES FROM BLOCK
  DESIGNS WERE FORMULATED BY SINGLETON AND NEUMANN.
  THE FIRST PART OF THE REPORT EXTENDS SINGLETON'S
  METHOD FOR DESIGNING UNIPOLAR SWITCHES TO THE DESIGN
  OF BIPOLAR SWITCHES. A NEW CLASS OF LOW NOISE
  SWITCHES IS OBTAINED BY PERMUTATION OF THE WINDING
  MATRIX OF NOISELESS SWITCHES AND IT IS SHOWN HOW
  THESE NEW SWITCHES ARE RELATED TO BLOCK DESIGNS.
  THE LATTER PART OF THE REPORT IS CONCERNED WITH
  METHODS OF OBTAINING ERROR DETECTING AND ERROR
  CORRECTING CODES FROM BLOCK DESIGNS. SOME OF THESE
  CODES ARE FOUND TO BE OPTIMAL. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-643 158   9/5
  AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD
  MASS
  CATEGORIZATIONS AND REALIZATIONS OF POSITIVE REAL AND
  BIQUADRATIC IMMITTANCE FUNCTIONS. PART II:
  PROGRAMMED REALIZATIONS.   (U)
DESCRIPTIVE NOTE: PHYSICAL AND MATHEMATICAL SCIENCES
  RESEARCH PAPERS,
     AUG 66   178P   HAASE,KURT H. I
REPT. NO.   AFCRL-PMSRP-215-PT-2 ,AFCRL-66-243-PT-
  2
PROJ: AF-5628
TASK: 562806

        UNCLASSIFIED REPORT

DESCRIPTORS: (*ELECTRICAL NETWORKS, SYNTHESIS),
  ADMITTANCE, ELECTRICAL IMPEDANCE, NUMERICAL
  ANALYSIS, GRAPHICS, FUNCTIONS, COMPUTERS,
  CIRCUITS   (U)

  CATEGORIZATIONS AND REALIZATIONS ARE APPLIED TO
  POSITIVE REAL AND BIQUADRATIC IMMITTANCE FUNCTIONS IN
  NINE NUMERICAL EXAMPLES. COMPUTATION PLANS AND
  ROUTINE COMPUTATION PROCEDURES ARE DEVELOPED
  PREDOMINANTLY FOR THE USE OF DESK CALCULATING
  MACHINES. THIS PORTION PRESENTS THE APPLICATION OF
  A THEORY THAT HAS BEEN DISCUSSED IN AD-634 764,
  'CATEGORIZATIONS AND REALIZATIONS OF POSITIVE
  REAL AND BIQUADRATIC IMMITTANCE FUNCTIONS.'
  THE EXAMPLES MEET ANY POSSIBLE OCCURRENCE OF
  POSITIVE REAL AND BIQUADRATIC IMPEDANCE OF THE
  ADMITTANCE FUNCTION. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-656 872   9/5   9/2
  ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND)
  LINEAR CIRCUIT ANALYSIS BY MEANS OF A DIGITAL
  COMPUTER.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     JAN 67   29P   CRADWICK,C. C. I
REPT. NO. RAE-TR-67012

        UNCLASSIFIED REPORT

DESCRIPTORS: (*ELECTRICAL NETWORKS, MATHEMATICAL
 ANALYSIS), (*COMPUTER PROGRAMS, ELECTRICAL
 NETWORKS), LINEAR SYSTEMS, DIGITAL COMPUTERS,
 DESIGN, MATRIX ALGEBRA, COSTS   (U)

   ONLY QUITE SIMPLE ELECTRONIC CIRCUITS CAN NORMALLY
   BE ANALYSED EXACTLY BY MANUAL MEANS, DUE TO THE LABOR
   INVOLVED IN SOLVING THE CIRCUIT EQUATIONS. THIS
   REPORT IS AN INTRODUCTION TO THE USE OF A DIGITAL
   COMPUTER TO OVERCOME THIS PROBLEM. A GENERAL
   PURPOSE PROGRAMME IS DESCRIBED WHICH WILL ANALYSE
   LINEAR CIRCUITS, CONTAINING BOTH PASSIVE AND ACTIVE
   ELEMENTS, OF UP TO 50 NODES, AND THE UNDERLYING
   CIRCUIT ANALYSIS IS DISCUSSED IN SOME DETAIL.
   (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-658 980   12/2
  ARMY ELECTRONICS COMMAND FORT MONMOUTH N J
  APPLICATION OF BOOLEAN ALGEBRA TO ANALYSIS AND
  SIMULATION OF NETWORKS.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     JUL 67   18P   DUNN,ROBERT M. !
REPT. NO. ECOM-2856
PROJ: D4-1E6-20105-A485
TASK: 1E6-20105-A485-99-01

       UNCLASSIFIED REPORT

DESCRIPTORS: (*OPERATIONS RESEARCH, *NETWORKS),
  (*ALGEBRAS, OPERATIONS RESEARCH),
  OPTIMIZATION, SIMULATION, ALGORITHMS,
  CLASSIFICATION, ANALYSIS, TRANSPORTATION,
  COMMUNICATION SYSTEMS, INFORMATION RETRIEVAL   (U)

  AN APPLICATION OF REVISED TECHNIQUES OF BOOLEAN
  MATRIX ALGEBRA IS MADE TO NETWORK ANALYSIS AND
  SIMULATION. TWO CLASSES OF NETWORKS ARE DISCUSSED
  -- TRANSPORTATION/COMMUNICATION AND CLASSIFICATION/
  INFORMATION RETRIEVAL. THE ADVANTAGE OF THE
  TECHNIQUE IS HIGH-SPEED COMPUTATION FOR RELATIVELY
  LARGE NETWORKS, E.G., > 1,000 ELEMENTS.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-659 314   9/5   9/2
  FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
  ASSIGNMENT AND PROGRAM CONTROL OF BOUNDARY CONDITIONS
  DURING SOLUTION OF NONSTATIONARY BOUNDARY VALUE
  PROBLEMS OF NETWORK SIMULATORS,   (U)
      AUG 67   17P   MUROMSKII,A. V. :
REPT. NO. FTD-MT-67-34
MONITOR: TT   67-62997

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ZADANIE I PROGRAMMNOE UPRAVLENIE
 GRANICHNYMI USLOVIYAMI PRI RESHENII NESTATSIONARNYKH
 KRAEVYKH ZADACH NA SETOCHNYKH MODELYAKH, EDITED
 MACHINE TRANS. OF MONO. ANALOGOVYE METODY I SREDSTVA
 RESHENIYA KRAEVYKH ZADACH, KIEV, 1964 P74-84.

DESCRIPTORS: (*INTEGRATORS, ELECTRICAL
 NETWORKS), (*ELECTRICAL NETWORKS, *BOUNDARY
 VALUE PROBLEMS), AMPLIFIERS,
 GATES(CIRCUITS), ELECTRIC CURRENTS, CRYSTAL
 OSCILLATORS, MODELS(SIMULATIONS),
 COMPUTERS   (U)

  THIS WORK CONSIDERS THE SYSTEM FOR ASSIGNING THE
  BOUNDARY CONDITIONS IN CONTEMPORARY ELECTRONIC
  MODELS, THE NEED FOR PROGRAM ASSIGNMENT OF BOUNDARY
  CONDITIONS FOR ANY MOMENTS OF TIME, SIMULTANEOUS
  ASSIGNMENT OF TIME VARIABLES OF BOUNDARY CONDITIONS,
  STORED CONTROL OF CHANNELS FOR ASSIGNING THE BOUNDARY
  CONDITIONS, AND THE CONVERSION OF THE UNIQUE
  ELECTRONIC INTEGRATOR EI-S INTO THE UNIVERSAL
  NETWORK ELECTRONIC MODEL USM-1. THE OPERATING
  CONDITIONS OF THE EI-S BOUNDARY CONDITION
  ASSIGNMENT SYSTEM ARE GIVEN, AS IS THE FUNCTIONAL
  DIAGRAM OF THE SYSTEM.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZE0463

AD-662 878   9/2   12/2
  VITRO CORP OF AMERICA EGLIN AFB FLA VITRO SERVICES
  DIV
  LOGIC, LOGICAL DESIGN AND DIGITAL CIRCUITS,   (U)
      DEC 67   103P   SHERER,H. K. I
CONTRACT: F08635-68-C-0001
MONITOR: APGC   TR-67-141

        UNCLASSIFIED REPORT

DESCRIPTORS: (*COMPUTER LOGIC, DIGITAL
 COMPUTERS), BINARY ARITHMETIC, ALGEBRAS,
 DIGITAL SYSTEMS, MATHEMATICAL LOGIC, SPECIAL
 FUNCTIONS(MATHEMATICAL), LOGIC CIRCUITS   (U)

  THE MATERIAL BEGINS WITH A DISCUSSION OF LOGICAL
  PROPOSITIONS AND THEIR MATHEMATICAL EXTENSION -
  BOOLEAN ALGEBRA. THIS IS FOLLOWED BY VARIOUS
  REPRESENTATIONS OF BOOLEAN FUNCTIONS INCLUDING THE
  GRAPHICAL METHOD. THE CONCEPT OF DESIGNATION
  NUMBERS AS A UNIQUE CIRCUIT DESCRIPTION IS DEVELOPED
  FOLLOWED BY SIMPLIFICATION METHODS AND REDUCTION BY
  MAPS. APPLICATION OF THESE METHODS TO ACTUAL
  CIRCUIT DESIGN IS DEMONSTRATED BY VARIOUS EXAMPLES.
  IN THE FINAL PORTION THE MORE COMMON DIGITAL
  BUILDING BLOCKS ARE PRESENTED AND DISCUSSED.
  (AUTHOR)   (U)

AD-668 205   9/2   9/5
  STANFORD RESEARCH INST MENLO PARK CALIF
  A PERMUTATION NETWORK,   (U)
          67   8P   WAKSMAN,ABRAHAM I
CONTRACT: NONR-4833(00)

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN JOURNAL OF THE
  ASSOCIATION FOR COMPUTING MACHINERY, V15 N1 P159-63
  JAN 1968.

DESCRIPTORS: (*SWITCHING CIRCUITS,
  PERMUTATIONS), (*LOGIC CIRCUITS, DESIGN),
  (*COMPUTERS, DESIGN), RELAXATION OSCILLATORS,
  SET THEORY, COMBINATORIAL ANALYSIS, ALGORITHMS,
  THEOREMS   (U)
IDENTIFIERS: *PERMUTATION NETWORKS, CIRCUIT
  THEORY   (U)

  THE CONSTRUCTION OF A SWITCHING NETWORK CAPABLE OF
  N FACTORIAL-PERMUTATION OF ITS N INPUT TERMINALS TO
  ITS N OUTPUT TERMINALS IS DESCRIBED. THE BUILDING
  BLOCKS FOR THIS NETWORK ARE BINARY CELLS CAPABLE OF
  PERMUTING THEIR TWO INPUT TERMINALS TO THEIR TWO
  OUTPUT TERMINALS. THE NUMBER OF CELLS USED BY THE
  NETWORK IS (N LOG TO THE BASE 2 OF N - N+1) =
  SUMMATION FROM K=1 TO K=N OF THE QUANTITY (LOG TO
  THE BASE 2 OF K). IT COULD BE ARGUED THAT FOR
  SUCH A NETWORK THIS NUMBER OF CELLS IS A LOWER BOUND,
  BY NOTING THAT BINARY DECISION TREES IN THE NETWORK
  CAN RESOLVE INDIVIDUAL TERMINAL ASSIGNMENTS ONLY AND
  NOT THE PARTITIONING OF THE PERMUTATION SET ITSELF
  WHICH REQUIRES ONLY (LOG TO THE BASE 2 OF N
  FACTORIAL) = (SUMMATION FROM K=1 TO K=N OF THE
  QUANTITY LOG TO THE BASE 2 OF K) BINARY DECISIONS.
  AN ALGORITHM IS ALSO GIVEN FOR THE SETTING OF THE
  BINARY CELLS IN THE NETWORK ACCORDING TO ANY
  SPECIFIED PERMUTATION. (AUTHOR)   (U)

INFORMATION, COMMUNICATION, AND SYSTEMS THEORY

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-257 607
   HUMAN SCIENCES RESEARCH INC MCLEAN VA
   MEASURING THE RELEVANCE OF AN ITEM OF INFORMATION TO
   THE COMMAND OF A COMPLEX MAN-MACHINE SYSTEM   (U)
      JAN 61   IV   SCHREIBER,ALVIN L.I
REPT. NO. TN 61 1 SM
CONTRACT: NONR252500

         UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION THEORY, *COMPUTERS,
 *MILITARY PERSONNEL, *OPERATIONS RESEARCH, ANALYSIS,
 DATA PROCESSING SYSTEMS, DATA STORAGE SYSTEMS, DATA
 TRANSMISSION SYSTEMS, DIGITAL COMPUTERS,
 EFFECTIVENESS, LEARNING, MATHEMATICAL COMPUTER DATA,
 MEASUREMENT, NAVAL PERSONNEL, PROBABILITY, RESEARCH
 PROGRAM ADMINISTRATION, TEST METHODS, TESTS   (U)

   A MATHEMATICAL APPROACH IS PRESENTED ON ONE OF THE
   MOST CRITICAL PROBLEMS IN DEVELOPMENT OF COMMAND
   CONSOLES AND DISPLAYS, I.E., THE EVALUATION OF THE
   RELEVANCE OF POTENTIAL INFORMATION INPUTS. IT MAY
   BE APPLIED TO ANY K... OF PROPOSED SYSTEM TO
   DETERMINE COMMAND INFORMATION REQUIREMENTS WHEN
   CURRENT METHODS MAY NOT BE ADEQUATE TO THE TASK.
   (AUTHOR)   (U)

AD-260 063
  STANFORD RESEARCH INST MENLO PARK CALIF
  THE STRUCTURING AND ANALYSIS OF COMPLEX SYSTEM
  PROBLEMS   (U)
                  IV   SCHAEFFER,X.H.;SHAPERO,ALBERT:
CONTRACT: AF49 638 1020
MONITOR: AFOSR   8;0

        UNCLASSIFIED REPORT

DESCRIPTORS: .OPERATIONS RESEARCH, ANALYSIS,
 COMMUNICATION THEORY, COMPUTERS, DESIGN, HUMAN
 ENGINEERING, MATHEMATICAL COMPUTER DATA, SYMPOSIA   (U)

  MANY COMPLEX SYSTEMS CONSIST OF TOO MANY DIFFERENT
  TYPES OF ELEMENTS AND ARE INFLUENCED BY TOO MANY
  FACTORS TO LEND THEMSELVES READILY TO
  CONCEPTUALIZATION THROUGH MATHEMATICAL MODELS,
  WITHOUT INTRODUCING UNREALISTIC OVERSIMPLIFICATIONS.
  TO STRUCTURE SUCH SYSTEMS REALIZTICALLY, AN
  APPROACH HAS BEEN DEVELOPED WHICH BEGINS WITH THE
  CLASSIFICATION OF THE ELEMENTS AFFECTING THE SYSTEM
  AND THE DETERMINATION OF THE EXISTENCE OF CERTAIN
  TYPES OF RELATIONS BETWEEN THESE ELEMENTS. THE
  APPROACH WHICH IS KNOWN AS THE SYSTEM ANALYSIS
  AND INTEGRATION MODEL (SAIM) HAS BEEN APPLIED
  TO THE ANALYSIS OF A NUMBER OF SYSTEM PROBLEMS
  CONCERNING WEAPON SYSTEM DEVELOPMENT, INCLUDING
  COMMAND AND CONTROL. OTHER PROBLEM AREAS TO WHICH
  THE METHOD HAS BEEN APPLIED ARE THE ANALYSIS OF
  POSTATTACK RECOVERY, POLITICAL CONFLICTS, AND LARGE-
  SCALE ORGANIZATIONS. THE PAPER CONCLUDES WITH A
  DISCUSSION OF THE FUNCTION OF THIS GENERAL APPROACH
  IN THE DEVELOPMENT OF FORMAL MODELS WHICH
  REALISTICALLY REPRESENT COMPLEX SYSTEM PROBLEMS.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZFO4₄3

AD-260 505
   OPERATIONAL APPLICATIONS OFFICE AIR FORCE ELECTRONIC
   SYSTEMS DIV BEDFORD MASS
   PLANS FOR MAN-COMPUTER COMMUNICATIONS RESEARCH USING
   THE RELIABILITY TEST ASSEMBLY COMPUTER AND THE
   ADVANCED DISPLAY CONSOLE AS RESEARCH TOOLS   (U)
      JUN 61   IV

      UNCLASSIFIED REPORT

DESCRIPTORS: *DATA PROCESSING SYSTEMS, *DISPLAY
 SYSTEMS, *HUMAN ENGINEERING, COMMUNICATION THEORY,
 COMPUTERS, RELIABILITY, TEST EQUIPMENT, TESTS   (U)
IDENTIFIERS: SAGE   (U)

   THE ADVANCED DISPLAY CONSOLE AND RTA COMPUTER
   DEVELOPED UNDER SAGE II CONTRACTS WILL BE MODIFIED
   FOR USE IN MAN-MACHINE COMMUNICATIONS EXPERIMENTS.
   MAN-MACHINE COMMUNICATION PROCEDURE WILL BE STUDIEₙ
   IN FIVE ASPECTS: (1) PREPARATION OF DATA TO MAKE
   UP VISUAL MESSAGES, (2) PRESENTATION OF THE
   MESSAGES, (3) RETRIEVAL OF DATA NOT ALREADY
   DISPLAYE , (4) CHOICE BEHAVIOR OF THE MAN, AND
   (5) PROCESSING OF THE MAN'S OUTPUT. PRESENT
   SCHEDULING INDICATES FULL AVAILABILITY OF THE
   EQUIPMENT FOR COM UNICATIONS EXPERIMENTS BY 1
   FEBRUARY 1962. (AUTHOR)   (U)

AD-268 009
  CHICAGO UNIV ILL
  IN SEARCH OF THE FUNDAMENTAL UNITS OF PERCEPTION: AN
  OUTLINE   (U)
      JUN 61   IV   GREENE,PETER H.:
CONTRACT: AF49 638 414
MONITOR: AFOSR   TN60 622

        UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION THEORY, *COMPUTERS,
 *PERCEPTION, COMPUTER LOGIC, NERVOUS SYSTEM   (U)

  MANY PROPERTIES OF NEURONS AND NEURAL NETWORKS MAY
  BE DESCRIBED MATHEMATICALLY. THE RELATION OF THESE
  PROPERTIES TO PERCEPTION MAY BE UNDERSTOOD, HOWEVER,
  ONLY IF ONE HAS SOME IDEA OF THE NATURE OF THE
  FUNDAMENTAL UNITS OF PERCEPTION. MUCH STUDY HAS
  BEEN DEVOTED TO THE PROBLEM OF HOW THE BRAIN
  TRANSFORMS INCOMING SIGNALS INTO USEFUL FORM. AN
  AREA OF STUDY WHICH IS COMPARATIVELY UNDEVELOPED IS
  INVESTIGATION OF THE ACTIVE ROLE OF THE NERVOUS
  SYSTEM IN THE FORGING OF SIGNIFICANT PERCEPTUAL
  UNITS; AND THE FITTING OF THESE UNITS TO EXPERIENCE.
  THE PRESENT OUTLINE IS DESIGNED AS AN ELEMENTARY
  INTRODUCTION TO IDEAS IN THIS AREA. IT IS
  INTENDED AS AN ELABORATION OF THE AUTHOR'S PAPER
  AN APPROACH TO COMPUTERS THAT PERCEIVE,
  LEARN, AND REASON, (PROC. WESTERN JOINT
  COMPUTER CONF., 1959, REPRINTED IN GENERAL
  SYSTEMS YEARBOOK, VOL. V, 1960), AND AS
  AN INTRODUCTION TO MATHEMATICAL RESULTS CITED HEREIN.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-275 535
  SCOPE INC RESTON VA
  DEVELOPMENT OF AN ADVANCED CONDITIONED REFLEX
  MODEL   (U)
                    IV

    UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION THEORY, *COMPUTER STORAGE
 DEVICES, *CONDITIONED REFLEX, *DATA STORAGE SYSTEMS,
 *MATHEMATICAL LOGIC, *SIMULATION, CODING, COMPUTERS,
 CONTROL SYSTEMS, DESIGN, FEASIBILITY STUDIES,
 FEEDBACK, MAGNETIC TAPE, MANGANESE COMPOUNDS,
 PHOTOTUBES, PROBABILITY, PROGRAMMING (COMPUTERS),
 RESISTORS, SAMPLING, SEQUENCES, STATISTICAL ANALYSIS,
 STATISTICAL DISTRIBUTIONS, SWITCHING CIRCUITS   (U)

  THE DESIGN AND CONSTRUCTION OF AN ADVANCED
  LABORATORY CONDITIONED-REFLEX MODEL TO DEMONSTRATE
  THE FEASIBILITY OF A CONDITIONED-REFLEX SYSTEM FOR
  ECM AUTOMATIC MODE SELECTION. THE ORGANIZATION
  OF THE MODEL CONSISTS OF A SENSORY FIELD CONNECTED TO
  A DISCRIMINATION FIELD WHICH, IN TURN, IS CONNECTED
  TO SEVERAL MEMORY PLANES. EACH MEMORY PLANE IS
  ASSIGNED TO A CLASS OF INPUTS AND A RESPONSE IS
  EVOKED BY CORRELATING THE STORED INFORMATION WITH
  INPUT INFORMATION. THIS ANALYSIS INCLUDES A
  PROPOSED CCEPTANCE TEST PROCEDURE AND A DISCUSSION
  FOR USES OF THE MACHINE IN THE LABORATORY. IT ALSO
  EMPHASIZES THE THOUGHT GIVEN TO DEMONSTRATING THE
  CAPABILITY OF THE HARDWARE MODEL. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-275 549
  ARMY ELECTRONIC PROVING GROUND FORT HUACHUCA ARIZ
  INVESTIGATION OF MODEL TECHNIQUES   (U)
      JUL 61   IV
REPT. NO. SIG 940 43R1

        UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION SYST.MS, *COMMUNICATION
 THEORY, ALGEBRAS, ANALOG COMPUTERS, ANALYSIS,
 CATALOGS, DIGITAL COMPUTERS, ELECTRICAL NETWORKS,
 LINEAR PROGRAMMING, LINEAR SYSTEMS, NUMERICAL METHODS
 AND PROCEDURES, SIMULATION, THEORY, THYRATRONS,
 TOPOLOGY   (U)

  A CATALOG IS PRESENTED OF MODELING TECHNIQUES
  APPLICABLE TO THE SIMULATION, ANALYSIS, AND
  EVALUATION OF COMMUNIC TIO SYSTEMS UNDER A VARIETY
  OF OPERATION L CONDITIONS. THE TECHNIQUES PRESENTED
  ARE GENERALI ED NETWORKS, MINIMAL VALUEAND MINIMAL
  PATH TECHNIQUES, RESISTOR NETWORKS, BOOLEAN ALGEBRA,
  MATHEMATICAL THEORY OF COMMUNICATION (INFORMATION
  THEORY), QUEUING THEORY, TOPOLOGY, LINEAR
  PROGRAMMING, MONTE CARLO TECHNIQUE, THE
  BOLDYREFF FLOODING TECHNIQUE, BROADVIEW INTER
  EDIATE IBM 650 DIGITAL COMPUTER, C SE INSTITUTE
  XPERIME TAL IBM 650 MODELS, BLOCK LOADING DELAY
  MODEL, THE BROADVIEW THYRATRON AND
  ELECTROMECHANICAL MODELS, THE ERNIAC, THE NEON
  BULB MODEL, THE TACK-0 ANALY R (MO EL ,
  U 'IAC, THE MINIMUM DEL Y MODEL, MATRI ESCRIPTION
  OF NETWORK , A SYSTHESIS OF MODELING TECHNIQUES FOR
  COMMUNICATION NETWORKS, AND DIMENSIONAL ANALYSIS.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-293 888
   PENNSYLVANIA UNIV PHILADELPHIA MOORE SCHOOL OF
   ELECTRICAL ENGINEERING
   .HE TREE AS A STRATAGEM FOR AUTOMATIC INFORMATION
   HANDLING   (U)
      DEC 62   IV   LANDAUER,WALTER I.I
REPT. NO. 63 15
CONTRACT: NONRS5140AF30 602 2382

      UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION THEORY, *DATA PROCESSING
   SYSTEMS, CODING, COMPUTER LOGIC, COMPUTER .TORAGE
   DEVICES, COMPUTERS, DATA STORAGE SYSTEMS   (U)

   THE TREE AS A STRATAGEM FOR AUTOMATIC INFORMATION
   HANDLING.

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-299 248
  GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT
  STATION
  AUTOMATED SOLUTION OF COMBINED INTERFERENCE
  MATRICES   (U)
      NOV 62   IV   PERLIN,I.E.;TECHO,R.;
CONTRACT: DA36 039SC88920

        UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION EQUIPMENT, *COMMUNICATION
 SYSTEMS, *COMMUNICATION THEORY, *MATRIX ALGEBRA,
 ANTIMISSILE DEFENSE SYSTEMS, DIGITAL COMPUTERS,
 INTERFERENCE, PROGRAMMING (COMPUTERS)   (U)

 A PROCEDURE FOR FINDING ALL PERMISSIBLE BASIC COMMUNICATION
 NETWORKS THAT CAN BE DERIVED FROM A GIVEN SET OF MUTUAL
 INTERFERENCE MATRICES IS DEVELOPED.

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0443

AD-403 761
    ARMY ELECTRONICS LABS FORT MONMOUTH N J
    AN APPLICATION OF HEURISTIC PROGRAMMING TO THE
    PROBLEM OF THEOREM PROVING BY MACHINE,   (U)
        MAR   63   16P   AMOROSO,SERAFINO :
TASK: 3A99 25 004 03
MONITOR: AELRDL   TR2345

        UNCLASSIFIED REPORT

DESCRIPTORS: *COMMUNICATION THEORY, FUNCTIONS,
 MATHEMATICAL LOGIC, DIGITAL COMPUTERS, DICTION
 ARIES, LANGUAGE, VOCABULARY, PROGRAMMING
 (COMPUTERS).   (U)
IDENTIFIERS: QUANTIFICATION THEORY, COMIT PRO
 GRAM, TRUTH FUNCTIONS.   (U)

    A MECHANICAL PROCEDURE USING TRIAL AND ERROR
    TECHNIQUES IS OUTLINED WHICH WILL VERIFY, IN A LARGE
    NUMBER OF CASES, THE VALIDITY OF AN ARGU MENT FORM
    EXPRESSED IN QUANTIFICATION THEORY. COMBINATIONAL
    PROCESSES WERE USED TO A MINIMUM EXTENT.
    TECHNIQUES OF IMPLEMENTATION FOR A DIGI TAL
    COMPUTER ARE ALSO DISCUSSED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-406 251
  HONEYWELL INC MINNEAPOLIS MINN
  COMMAND AND CONTROL SYSTEMS ANALYSIS.   (U)
DESCRIPTIVE NOTE: FINAL REPT.,
      DEC   62   142P   BUTZ,A. R. ;WINRICH,L. B. ;
MONITOR: RADC   TDR62 612

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: *COMMAND AND CONTROL SYSTEMS,
 *OPERATIONS RESEARCH, *MATHEMATICAL MODELS,
 STATISTICAL ANALYSIS, DIGITAL COMPUTERS, GAME THEORY,
 DECISION MAKING, COMBINATORIAL ANALYSIS, SENSITIVITY,
 COMPUTERS, DISPLAY SYSTEMS, PROGRAMMING (COMPUTERS),
 MATHEMATICAL ANALYSIS, ANALYSIS, AIR DEFENSE COMMAND (U)
IDENTIFIERS: SAGE, DIGRAPH TECHNIQUES, BAYESIAN
 FORMULATIONS, MARKOV PROCESSES   (U)

  SYSTEMS ANALYSIS PROCEDURES ARE IMPORTANT FOR
  DETERMINING THE PROPER ALLOCATION OF INFORMATION
  HANDLING AND DECISION MAKING FUNCTIONS AMONG THE MEN
  IN LARGE MAN-MACHINE ORGANIZATIONS SUCH AS MILITARY
  COMMAND AND CONTROL SYSTEMS. RESEARCH IS REQUIRED
  FOR MODELING AND ANALYZING THESE FUNCTIONS AND
  RELATING THE SENSITIVITIES OF THESE FUNCTIONS TO THE
  SYSTEM CRITERION. THIS REPORT PRESENTS THE STEPS
  OF A GENERALIZED SYSTEMS ANALYSIS PROCEDURE FOR
  COMMAND AND CONTROL SYSTEMS. THE STEPS ARE THEN
  FOLLOWED UTILIZING AN EXISTING SAGE DIRECTION
  CONTROL SYSTEM AS A VEHICLE FOR THE STUDY.
  EMPHASIS IS PLACED UPON MODELING THE HUMAN
  ORGANIZATION AS A WHOLE. (AUTHOR)   (U)

AD-411 274
  JOHNS HOPKINS UNIV BALTIMORE MD
  REPRESENTATION AND ANALYSIS OF SIGNALS, PART XIV.
  TIME-VARYING SYSTEMS WITH SEPARABLE SYSTEM
  FUNCTIONS,   (U)
      JAN 63   94P   WEISS,LEONARD :
CONTRACT: NONR24853

        UNCLASSIFIED REPORT

DESCRIPTORS: (*NETWORKS, DIFFERENTIAL EQUA
  TIONS), (*SIGNALS, MATHEMATICAL ANALYSIS),
  COMMUNICATION THEORY, FUNCTIONS, TIME-LAG
  THEORY, MODULATION THEORY, ANALOG COMPUTERS,
  CONTROL SYSTEMS, INTEGRAL TRANSFORMS.   (U)
IDENTIFIERS: 1963.   (U)

  THE RELATIONSHIP OF THE DIFFERENTIAL EQUATION OF A
  SYSTEM TO THE SYSTEM'S WEIGHTING PATTERN (IM PULSE
  RESPONSE) IS DISCUSSED. HE REALIZATION OF LINEAR
  DIFFERENTIAL SYSTEMS IS DISCUSSED, AND SOME
  ''TRICKS'' REGARDING MANIPULATION OF THE POSITION OF
  FUNCTION GENERATORS IN AN ANALOG COMPUTER TYPE
  REALIZATION (WITHOUT CHANGING THE INPUT-OUTPUT
  RELATION) ARE PRESENTED. TIME VARYING SYSTEMS
  DESCRIBABLE BY SEPARABLE S-DOMAIN SYSTEM FUNCTIONS
  ARE DISCUSSED. AN S-DOMAIN SYS TEM FUNCTION
  H(S,T) IS DEFINED BY REGARDING THE RESPONSE OF A
  LINEAR DIFFERENTIAL SYSTEM TO AN INPUT EST AS
  H(S,T)EST. THE INTERPRETATION OF A SEPARABLE
  H(S,T) IN TERMS OF THE CORRESPONDING WEIGHTING
  PATTERN AND DIFFERENTIAL EQUATION IS DISCUSSED, AND
  IT IS PROVED THAT A SUFFICIENT CONDITION FOR
  SEPARABILITY IS THAT H(S,T) BE RATIONAL IN S.
  IT IS ALSO SHOWN THAT A NON RATIONAL SEPARABLE
  H(S,T) MUST OF NECESSITY BE A REPRESENTATION OF
  A NON-SEPARABLE H(S,T) CONSIST ING OF A FINITE
  NUMBER OF TERMS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-414 776
   SYSTEM DEVELOPMENT CORP SANTA MONICA CALIF
   AN INFORMATION-SYSTEM APPROACH TO THEORY OF
   INSTRUCTION WITH SPECIAL REFERENCE TO THE TEACHER, (U)
       MAR 63   6SP   RYANS,DAVID G. ;

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMUNICATION THEORY, INSTRUCTORS),
   (*INSTRUCTORS, BEHAVIOR), INFORMATION RETRIEVAL,
   LEARNING   (U)
IDENTIFIERS: 1963   (U)

   THIS IS AN ATTEMPT AT CONCEPTUALIZATION OR THEORY
   BUILDING WITH RESPECT TO THE INSTRUCTIONAL PROCESS.
   THE PURPOSE IS TO BLOCK OUT SOME OF THE CONDITIONS
   AND BEHAVIORAL CONSTRUCTS WHICH MAY BE HYPOTHESIZED
   TO CONTRIBUTE TO TEACHER BEHAVIOR AND THE
   INSTRUCTIONAL PROCESS. IN THIS PAPER, THE WRITER'S
   POSITION IS PRESENTED IN DETAIL, ADDITIONAL
   CONSTRUCTS ARE INTRODUCED AND EMPHASIZED, AND AN
   EFFORT IS MADE TO LOOK FURTHER INTO SOME OF THE
   IMPLICATIONS. THE TEACHER SYSTEM AND THE PUPIL
   SYSTEM ARE DESCRIBED IN TERMS OF THE ESSENTIAL
   CHARACTERISTICS OF ALL SYSTEMS--INFORMATION FLOW OR
   INFORMATION PROCESSING. THE INFLUENCING CONDITIONS
   THAT HAVE LED TO THIS ''INFORMATION SYSTEM THEORY OF
   INSTRUCTION'' ARE FOUR: (1) THE THINKING AND THE
   RESEARCH GROWING OUT OF A TEACHER CHARACTERISTICS
   STUDY, RELEVANT TEACHER BEHAVIOR RESEARCH REPORTED
   BY OTHER INVESTIGATIONS, AND EXPERIENCE WITH THE
   DATA ACCUMULATED IN CONNECTION WITH THE NATIONAL
   TEACHER EXAMINATIONS; (2) THE INTRODUCTION OF
   THE CONCEPTS OF ''GENERAL SYSTEM THEORY''; (3)
   SEARS' DIRECTION OF ATTENTION TO THE ''DYADIC
   SEQUENCE'' AS AN EXPLANATION OF SOCIAL BEHAVIOR; AND
   (4) THE GROWING INTEREST IN CONCEPTS ASSOCIATED
   WITH INFORMATION THEORY AND COMMUNICATION THEORY.
   (AUTHOR)   (U)

AD-430 739
  RAND CORP SANTA MONICA CALIF
  STUDIES IN INFORMATION PROCESSING THEORY: SIMILARITY
  AND FAMILIARITY IN VERBAL LEARNING,   (U)
     FEB 64   36P   SIMON,HERBERT A. ;
  FEIGENBAUM,EDWARD A. ;
REPT. NO. RM3979PR
CONTRACT: AF49 638 700

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMUNICATION THEORY, LEARNING),
 (*VERBAL BEHAVIOR, LEARNING), (*LEARNING,
COMMUNICATION THEORY), (*DATA PROCESSING SYSTEMS,
THEORY), MODELS (SIMULATIONS), EXPERIMENTAL DATA,
CODING   (U)
IDENTIFIERS: INFORMATION PROCESSING THEORY, EPAM-I,I
MODEL, AURAL RECODING, 1964, VERBAL LEARNING   (U)

  THIS MEMORANDUM PRESENTS RESULTS OBTAINED BY
  SIMULATING VARIOUS VERBAL LEARNING EXPERIMENTS WITH
  THE ELEMENTARY PERCEIVING AND MEMORIZING
  PROGRAM (EPAM), AN INFORMATION PROCESSING THEORY
  OF VERBAL LEARNING. PREDICTIONS WERE GENERATED FOR
  EXPERIMENTS MANIPULATING INTRA-LIST SIMILARITY
  (UNDERWOOD); INTER-LIST SIMILARITY (BRUCE);
  AND, FAMILIARITY AND MEANINGFULNESS. THE STIMULUS
  MATERIALS WERE NONSENSE SYLLABLES, LEARNED IN PAIRED-
  ASSOCIATE FASHION. A DESCRIPTION OF THE EPAM-III
  MODEL IS GIVEN. THE PREDICTIONS MADE BY THE MODEL
  ARE GENERALLY IN GOOD AGREEMENT WITH THE
  EXPERIMENTAL DATA. IT IS SHOWN THAT THE
  QUANTITATIVE FIT TO THE UNDERWOOD DATA CAN BE
  IMPROVED CONSIDERABLY BY INTRODUCING A PROCESS OF
  ''AURAL RECODING.'' THE FIT OF THE EPAM
  PREDICTIONS TO THE CHENZOFF DATA IS PARTICULARLY
  SIGNIFICANT SINCE IT LENDS SUPPORT TO THE HYPOTHESIS
  THAT THE MECHANISM BY MEANS OF WHICH A HIGH DEGREE OF
  MEANINGFULNESS OF ITEMS FACILITATES LEARNING IS THE
  HIGH FAMILIARITY OF THESE ITEMS. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-431 113
  MAGNAVOX CO TORRANCE CALIF
  STUDY OF CORRELATION PROPERTIES OF BINARY SEQUENCES.
                                                              (U)
DESCRIPTIVE NOTE: INTERIM REPT. NO. 1, 15 OCT 63-15
  JAN 64,
     JAN 64   37P   GOLD,ROBERT :
REPT. NO. R692
CONTRACT: AF33 615 1011

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*CORRELATION TECHNIQUES, COMPUTERS),
  (*COMMUNICATION SYSTEMS, SEQUENCES (MATHEMATICS)),
  (*PROGRAMMING (COMPUTERS), MATHEMATICAL MODELS),
  LINEAR SYSTEMS, ERRORS, COMMUNICATION THEORY,
  POLYNOMIALS, MATHEMATICAL ANALYSIS, MATHEMATICAL
  LOGIC, ALGEBRAS, CONFORMAL MAPPING, MATRIX
  ALGEBRA   (U)
IDENTIFIERS: 1964, EQUIVALENCE, ABSTRACT ALGEBRA,
  MERSENNE NUMBERS   (U)

  PROPERTIES OF THE CORRELATION PROPERTIES OF THE
  LINEAR SEQUENCES ARE DISCUSSED AND A NEW AND
  PROMISING APPROACH TO THE PROBLEM OF CORRELATION OF
  LINEAR SEQUENCES IS DEVELOPED. FAMILIES OF LINEAR
  SEQUENCES OF EQUAL PERIOD ARE GENERATED FROM A SINGLE
  SHIFT REGISTER. THE CLASS OF SEQUENCES WITH
  BOUNDED CROSS CORRELATION IS DETERMINED AS WELL AS
  THE BOUNDS ON THE CROSS CORRELATION FUNCTION OF
  CERTAIN MAXIMAL SEQUENCES AND HENCE ON THE
  CORRESPONDING FAMILY OF SEQUENCES. THE APPENDIX
  PRESENTS A DISCUSSION OF ELEMENTARY PROPERTIES OF
  BINARY SEQUENCES, ELEMENTARY ALGEBRAIC PROPERTIES OF
  SEQUENCES, AND ERROR CORRECTING CODES. (AUTHOR)
                                                     (U)

AD-437 588
  HUMAN SCIENCES RESEARCH INC MCLEAN VA
  INFORMATION-PROCESSING TASKS IN TACTICAL ACTION
  SELECTION: PERFORMANCE OF EXPERIENCED SUBMARINE
  OFFICERS IN WEIGHTING MULTIPLE CRITERIA FOR DEPTH
  SELECTION.   (U)
DESCRIPTIVE NOTE: FINAL REPT. FOR JAN 62-MAR 64,
    MAR 64   150P   VAUGHAN,W. S. ,JR.;
  VIRNELSON,T. R. ;FRANKLIN,R. D.;
REPT. NO. RR63 26AE
CONTRACT: NONR367100

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*DATA PROCESSING SYSTEMS, JOB
 ANALYSIS), (*SUBMARINE PERSONNEL, OFFICER PERSONNEL),
 HUMAN ENGINEERING, SELECTION, PERFORMANCE TESTS   (U)

  THE PROBLEM OF HOW TO ALLOCATE TASKS BETWEEN MEN
  AND EQUIPMENT COMPONENTS OF A COMMAND AND CONTROL
  SYSTEM IS ADDRESSED. SPECIFIC
  INFORMATIONPROCESSING STEPS INVOLVED IN THE SELECTION
  OF A COURSE OF ACTION FROM AMONG ALTERNATIVES ARE
  DEFINED AS THE TASKS TO BE ALLOCATED IN A MAN/
  COMPUTER PARTNERSHIP. PERFORMANCE DATA REFLECTING
  THE ABILITY OF EXPERIENCED TACTICAL COMMANDERS TO
  PERFORM EACH OF THESE FIVE INFORMATION-PROCESSING
  TASKS SINGLY AND IN COMBINATION ARE REQUIRED AS A
  PART OF THE DATA BASE FOR ALLOCATION DECISION. THE
  RESULTS IDICATE THAT ALTHOUGH INDIVIDUAL COMMANDERS
  DIFFER FROM ONE ANOTHER IN THE IMPORTANCE THEY ATTACH
  TO A SET OF DEPTH SELECTION CRITERA, ANY ONE OFFICER
  IS HIGHLY CONSISTENT OF HIS JUDGMENTS OF IMPORTANCE
  AND THESE JUDGMENTS ARE STABLE OVER TIME AND
  SENSITIVE TO DIFFERENCES IN THE TACTICAL SITUATION.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-438 430
  MITRE CORP BEDFORD MASS
  MILITARY INFORMATION SYSTEMS,   (U)
      APR 64   22P   JACOBS,J. F. ;BENNETT,E. M.
   :
REPT. NO. SR92
CONTRACT: AF19 628 2090
PROJ: 600
MONITOR: ESD   TDR63 503

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMUNICATION SYSTEMS, MILITARY
 ORGANIZATIONS), (*MILITARY COMMUNICATIONS, INFORMATION
 RETRIEVAL), DATA PROCESSING SYSTEMS, MILITARY
 PERSONNEL, AUTOMATION, COMPUTERS   (U)

   AN INFORMATION SYSTEM IS CONCERNED WITH THE
   COMMUNICATION OF CONCEPTS AND DATA ABOUT THE SYSTEM
   ITSELF AND ITS ENVIRONMENT. MOST OF ITS TIME AND
   ENERGY IS SPENT IN DESIGNING ITSELF AS A SYSTEM, NOT
   IN COMMUNICATING STATUS INFORMATION OR ORDERS FOR
   ACTION. INFORMATION-PROCESSING JOBS ARE ARRANGED
   HIERARCHICALLY, AND FOR EACH JOB LEVEL, THERE IS A
   CORRESPONDING LEVEL OF AGGREGATION OF THE CONCEPTS
   AND DATA USED FOR INFORMATION PROCESSING. HIGH-
   LEVEL INFORMATION IS FILTERED THROUGH MANY LOWER
   LEVELS, EACH OF WHICH INTRODUCES SOME DEGREE OF NOISE
   OR BIAS INTO THE SYSTEM. COMMUNICATION OCCURS BOTH
   UP AND DOWN THE JOB HIERARCHY; MESSAGES PASSED
   DOWNWARD GENERALLY INCLUDE CONCEPTS AND DATA THAT
   DETERMINE SYSTEM OPERATION; MESSAGES PASSED UPWARD
   ARE USUALLY INDICATIONS OF HOW EFFECTIVELY THE SYSTEM
   IS DEVELOPING OR OPERATING. THE USE OF COMPUTERS
   IN INFORMATION SYSTEMS TENDS TO INCREASE
   SPECIALIZATION AROUND THE LOWER-LEVEL JOBS, AND,
   CONSEQUENTLY, SYSTEM COMMUNICATION AND INTEGRATION
   MAY BE INHIBITED. THEREFORE, THE INTRODUCTION OF
   COMPUTERS INTO INFORMATION SYSTEMS MUST ALWAYS BEGIN
   AT THE LOWEST LEVEL OF AGGREGATION IN THE JOB
   HIERARCHY. ONLY THOSE INFORMATION-PROCESSING JOBS
   WHOSE RULES CAN BE STANDARDIZED PRECISELY ARE
   SUITABLE FOR AUTOMATION. (AUTHOR)   (U)

AD-600 047
  IBM WATSON RESEARCH CENTER YORKTOWN HEIGHTS N Y
  SOME PROBLEMS IN INFORMATION SCIENCE WITH EMPHASIS ON
  ADAPTATION TO USE THROUGH MAN-MACHINE
  INTERACTION.   (U)
DESCRIPTIVE NOTE: FINAL REPT. VOL. II, 1 JAN-31
  DEC 63,
     APR 64   184P   KOCHEN,MANFRED :
CONTRACT: AF19 628 2752
PROJ: 5632
TASK: 563205
MONITOR: AFCRL   64 87

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*DATA PROCESSING SYSTEMS, COMMUNICAT,ON
 THEORY), (*COMMUNICATION THEORY, DATA PROCESSING
 SYSTEMS), (*INFORMATION RETRIEVAL, LEARNING),
 PROGRAMMING (COMPUTERS), DATA STORAGE SYSTEMS,
 DOCUMENTATION, MEMORY, LANGUAGE   (U)

  THE PROBLEM OF REPRESENTING, STORING, RECALLING AND
  PROCESSING OF RELEVANT INFORMATION IN THE
  INCREASINGLY COMPLEX ENVIRONMENT OF AN ORGANISM WERE
  STUDIED BY SIMULATION BASED ON LIST PROCESSING AND BY
  THEORETICAL INVESTIGATION RAWING ON SOCIOLOGY AND
  PSYCHOLOGY OF COGNITION, ENGINEERING STUDIES OF SEMI-
  AUTOMATED LIBRARY SYSTEMS, AND MATHEMATICAL THEORY OF
  GRAPH AND AUTOMATION. THE FOLLOWING ACCOMPLISHMENTS
  WERE MADE: PROGRESS TOWARD A LOGICAL STRUCTURING OF
  INFORMATION SCIENCE: CLASSIFICATION OF TYPES OF
  DISCOURSE, MODELLING OF AN INFORMATION SYSTEM IN
  TERMS OF MEMORY, PROCESSOR AND COMPREHENDER
  SUBSYSTEMS GOVERNED BY SELF-REGULATORY PRINCIPLES:
  OPERATIONAL ANALYSIS OF SPECIAL INFORMATION SYSTEMS:
  SPECIFICATION AND CONSTRUCTION OF COMPUTER PROGRAMS
  FOR CONCEPT AND LANGUAGE LEARNING: CRITICAL SURVEY OF
  ASSOCIATIVE MEMORIES: KEY-ADDRESS TRANSFORMATIONS FOR
  FILE ORGANIZATION: AND CLUSTERING ALGORITHMS BASED ON
  MEASURES OF RELEVANCE. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-603 775
  JOHNS HOPKINS UNIV BALTIMORE MD
  REPRESENTATION AND ANALYSIS OF SIGNALS: PART XVIII:
  VECTOR AND TENSOR ALGEBRA OF SIGNALS APPLIED TO
  SATELLITE NAVIGATION.   (U)
DESCRIPTIVE NOTE: DOCTORAL THESIS,
     JUL 64   237P   ROSS,DAN C. ;
CONTRACT: NONR4010 13

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: THIS RESEARCH WAS SPONSORED BY THE
 INTERNATIONAL BUSINESS MACHINES CORPORATION.

DESCRIPTORS: (*MATRIX ALGEBRA, COMMUNICATION THEORY),
 (*COMMUNICATION THEORY, MATRIX ALGEBRA), (*NAVIGATION
 SATELLITES, COMMUNICATION THEORY), SIGNALS, LINEAR
 SYSTEMS, ALGEBRA, SYSTEMS ENGINEERING, DATA PROCESSING
 SYSTEMS, FEASIBILITY STUDIES   (U)

  THE BASIC CONCEPTS OF SIGNALS AND LINEAR SYSTEMS
  ARE FORMULATED IN TERMS OF FINITE-DIMENSIONAL VECTOR
  ALGEBRA. IMPORTANT IDEAS, OFTEN CONFUSED OR OMITTED
  IN CLASSICAL SIGNAL THEORY, ARE CLARIFIED BY THE
  SYSTEM OF NOTATION AND NOMENCLATURE PRESENTED IN THE
  DISSERTATION. MEASUREMENT AND SPECIFICATION ARE
  EMPHASIZED IN THE NOTATION AS IS APPROPRIATE TO THEIR
  IMPORTANCE IN ENGINEERING PRACTICE. THE THEORY AND
  NOTATION ARE EXTENDED TO FINITE-DIMENSIONAL TENSOR
  PRODUCT SPACES. THE EXTENSION TO MULTI-LINEAR
  SYSTEMS OF THE ENGINEER'S INTUITIVE KNOWLEDGE OF
  LINEAR SYSTEMS IS ILLUSTRATED. THE ABSTRACT
  NOTIONS ARE ILLUSTRATED BY APPLICATION TO THE
  FAMILIAR PROBLEM OF TIME-DOMAIN MULTIPLICATION.
  THE UTILITY OF THE NOTATION AND THE TENSOR PRODUCT
  CONCEPTS IS DEMONSTRATED BY APPLICATION TO SATELLITE
  NAVIGATION SIGNAL PROCESSING. DESCRIPTIONS OF
  FEASIBILITY TESTS ON THE IBM 7094 AND EXCERPTS OF
  RESULTS ARE PRESENTED. THE RESULTS CONFIRM THE
  EXPECTED SIMPLICITY AND INDICATE A SURPRISINGLY HIGH
  ACCURACY OF THE PROCESSOR DESIGNED BY THE TENSOR
  PRODUCT APPROACH. (AUTHOR)   (U)

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DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-604 514
   RAND CORP SANTA MONICA CALIF
   ON COMMUNICATION PROCESSES INVOLVING LEARNING AND
   RANDOM DURATION,   (U)
      OCT 57   6P   BELLMAN,RICHARD :
   KALABA,ROBERT :
REPT. NO. P-1194A

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMUNICATION SYSTEMS, DYNAMIC
 PROGRAMMING), (*DYNAMIC PROGRAMMING, COMMUNICATION
 SYSTEMS), DECISION THEORY, STOCHASTIC PROCESSES,
 LEARNING, COMPUTER STORAGE DEVICES, PROBABILITY   (U)

   THE FUNDAMENTAL PROBLEM OF DETERMINING THE UTILITY
   OF A COMMUNICATION CHANNEL IN CONVEYING INFORMATION
   IS VIEWED AS A PROBLEM WITHIN THE FRAMEWORK OF
   MULTISTAGE DECISION PROCESSES OF STOCHASTIC TYPE, AND
   AS SUCH IS TREATED BY THE THEORY OF DYNAMIC
   PROGRAMMING. THE RELATIONS BETWEEN UTILITY AND
   CAPACITY, IN SHANNON'S SENSE, ARE INDICATED.
   TREATMENT OF COMMUNICATION PROBLEMS INVOLVING THE
   USE OF A CHANNEL WHOSE PROPERTIES ARE NOT COMPLETELY
   KNOWN, AND THOSE INVOLVING PROCESSES OF RANDOM
   DURATION, ARE SHOWN. TREATMENTS OF GENERAL
   PROCESSES IN A UNIFORM FASHION BY THE FUNCTIONAL
   EQUATION TECHNIQUE OF DYNAMIC PROGRAMMING ARE
   DISCUSSED. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-605 826
  DUNLAP AND ASSOCIATES INC DARIEN CONN
  MATHEMATICAL PROGRAMMING TECHNIQUES FOR INFORMATION
  SYSTEM DESIGN,   (U)
     JUL 64   72P   GAGLIARDI,U. O. ;YING,C. G.
  ;HOLT,L. G. ;
CONTRACT: AF19 628 2830
PROJ: 2804
MONITOR: ESD ,   TDR64 530

            UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*MATHEMATICAL PROGRAMMING,
  COMMUNICATION THEORY), (*COMMUNICATION THEORY,
  MATHEMATICAL PROGRAMMING), OPERATIONS RESEARCH,
  COMMUNICATION SYSTEMS, COMPUTERS, COMMAND AND CONTROL
  SYSTEMS, BOMBS, DAMAGE, DETERMINATION, WEAPON SYSTEMS,
  DECISION THEORY, STATISTICAL ANALYSIS, EFFECTIVENESS,
  DESIGN   (U)
IDENTIFIERS: INFORMATION SYSTEMS, BAYES
  EFFECTIVENESS   (U)

   THE PROBLEM OF ESTABLISHING THE EFFECTIVENESS OF AN
   INFORMATION SYSTEM IS CONSIDERED. AN EFFECTIVENESS
   MEASURE SUGGESTED BY RECENT DEVELOPMENT IN
   STATISTICAL DECISION THEORY IS PRESENTED. SAMPLE
   EVALUATIONS OR SYSTEM DESIGNS ARE USED TO ILLUSTRATE
   HERE THE ADOPTION OF SUCH A MEASURE WHICH ALLOWS
   SELECTING THE PARAMETERS OF THE SYSTEM IN A MANNER
   CONSISTENT WITH THE USER PREFERENCE. (AUTHOR)   (U)

AD-607 256
  OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS LAB OF
  AVIATION PSYCHOLOGY
  AN APPLICATION OF BAYES THEOREM AS A HYPOTHESIS-
  SELECTION AID IN A COMPLEX INFORMATION-PROCESSING
  SYSTEM.   (U)
DESCRIPTIVE NOTE: FINAL REPT. FOR 15 MAR 63-31 JAN 64.

     AUG 64   73P   SOUTHARD,JACK F. :
  SCHUM,DAVIS A. :BRIGGS,GEORGE E.:
CONTRACT: AF33 657 10763
PROJ: 7184
TASK: 718403
MONITOR: AMRL ,   TDR64 51

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*THREAT EVALUATION, DATA PROCESSING
 SYSTEMS), (*DECISION MAKING, THREAT EVALUATION),
 (*STATISTICAL ANALYSIS, MILITARY INTELLIGENCE),
 COMPUTERS, SIMULATION, PROBABILITY, MATHEMATICAL
 PREDICTION, THEOREMS, OFFICER PERSONNEL, AIR DEFENSE
 COMMAND, HUMAN ENGINEERING, PERFORMANCE (HUMAN), REAL
 TIME, APPLIED PSYCHOLOGY, SYSTEMS ENGINEERING,
 SIMULATION   (U)
IDENTIFIERS: MAN-MACHINE SYSTEMS, BAYES THEOREM   (U)

    THE FIRST OF A SERIES OF EXPERIMENTS INVESTIGATING
    THE VALUE OF AUTOMATED HYPOTHESIS-EVALUATION AIDS IN
    MULTIMANMACHINE SYSTEMS DEVOTED TO ASSESSING OR
    DIAGNOSING THREAT IS DESCRIBED. IN THE EXPERIMENT,
    AN EIGHT-MAN TEAM EVALUATED THREATS POSED BY A
    HYPOTHETICAL AGGRESSOR. THE TEAM MADE THESE
    EVALUATIONS ON THE BASIS OF INTELLIGENCE INFORMATION
    GATHERED DURING SIMULATED RECONNAISSANCE OVERFLIGHTS
    OF AGGRESSOR'S TERRITORY. THE PRIMARY OUTPUT OF
    THE THREAT-EVALUATION TEAM WAS THE COMMANDING
    OFFICER'S POSTERIOR PROBABILITIES ESTIMATES AS TO
    AGGRESSOR'S MOST LIKELY HOSTILE STRATEGIES. DURING
    HALF OF THE EXPERIMENTAL TRIALS, THE COMMANDER HAD
    ACCESS TO COMPUTER-PRODUCED POSTERIOR PROBABILITIES
    BASED UPON A MODIFICATION OF THE BAYES THEOREM.
    THE MAJOR EXPERIMENTAL ISSUE WAS WHETHER OR NOT
    THESE WOULD AID THE COMMANDER IN HIS HYPOTHESIS
    EVALUATION. ALSO INVESTIGATED WAS THE EFFECT OF
    DATA-PROCESSING LOAD UPON SYSTEM OPERATION.
    ALTHOUGH SOME IMPROVEMENT IN THE POSTERIOR
    PROBABILITIES ESTIMATES RESULTED FROM THE COMMANDER'S
    HAVING ACCESS TO THE HYPOTHESIS-EVALUATION AID AND
    THIS IMPROVEMENT BECAME MORE PRONOUNCED AS SYSTEM   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-608 108
  OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS LAB OF
  AVIATION PSYCHOLOGY
  SUBJECT CONTROL OVER A BAYESIAN HYPOTHESIS SELECTION
  AID IN A COMPLEX INFORMATION PROCESSING SYSTEM.   (U)
DESCRIPTIVE NOTE: FINAL REPT. FOR 1 JUN 63-15 APR 64,
     SEP 64   54P   SOUTHARD,JACK F. :
  SCUM,DAVID A. ;BRIGGS,GEORGE E.;
CONTRACT: AF33 657 10763
PROJ: 7184
TASK: 718403
MONITOR: AMRL ,   TR64 95

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*DECISION MAKING, THREAT EVALUATION),
 (*THREAT EVALUATION, DECISION MAKING), MILITARY
 PSYCHOLOGY, HUMAN ENGINEERING, INFORMATION RETRIEVAL,
 COMPUTERS, MATHEMATICAL PREDICTION, SIMULATION   (U)
IDENTIFIERS: BAYES' THEOREM   (U)

  THIS REPORT DESCRIBES THE SECOND EXPERIMENT IN A
  SERIES DEVOTED TO ESTIMATING THE EFFECTIVENESS OF
  AUTOMATED HYPOTHESIS SELECTION IN MAN-MACHINE SYSTEMS
  IN WHICH THREAT EVALUATIONS OR THREAT DIAGNOSES ARE
  BEING PERFORMED. IN THE EXPERIMENT AN EIGHT-MAN
  TEAM PRODUCED EVALUATIONS OF VARIOUS THREATS POSED BY
  A HYPOTHETICAL AGGRESSOR. THESE EVALUATIONS WERE
  MADE ON THE BASIS OF INTELLIGENCE INFORMATION
  GATHERED ON SIMULATED RECONNAISSANCE OVERFLIGHTS OF
  THE HOMELAND AREA OF THE AGGRESSOR. IBM 1401 AND
  7090 COMPUTER FACILITIES PROVIDED THE MEANS FOR
  GENERATING THE COMPLEX STIMULUS ENVIRONMENT OR DATA
  BASE. THE PRIMARY OUTPUT FROM THIS THREAT
  EVALUATION TEAM WAS A SERIES OF A POSTERIORI
  PROBABILITIES ESTIMATIONS PRODUCED BY THE TEAM'S
  COMMANDING OFFICER (CO). THESE ESTIMATIONS
  REPRESENTED THE CO'S JUDGMENTS AS TO THE MOST
  LIKELY OF THE FOUR RESPONSE ALTERNATIVES AVAILABLE TO
  AGGRESSOR IN DEPLOYING HIS FORCES ALONG A BORDER OF
  CONTENTION. THE PURPOSE OF THE EXPERIMENT WAS TO
  OBSERVE WHETHER INCREASING CONTROL OVER THE MBT-AID
  MECHANISM WOULD INCREASE THE USER'S ACCEPTANCE OF THE
  AID AND IMPROVE HIS THREAT-DIAGNOSIS PERFORMANCE.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 2FDM63

AD-615 221
  FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
  STOCHASTIC AGGREGATES AND QUESTIONS IN THE THEORY OF
  INFORMATION,   (U)
      APR 65   1HP   CHAVCHANIDZE,V. V. ;
REPT. NO. FTD-TT-64-1155
MONITOR: TT ,   65-62221

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF
 AKADEMIYA NAUK GRUZINSKOI SSR, TIFLIS. INSTITUT
 FIZIKI. TRUDY V8 P277-85 1962.

DESCRIPTORS: (*COMMUNICATION THEORY, GROUPS
 (MATHEMATICS)), (*GROUPS (MATHEMATICS), STOCHASTIC
 PROCESSES), MATHEMATICAL LOGIC, NUMERICAL METHODS AND
 PROCEDURES, PROBABILITY, COMPUTERS, USSR   (U)

  FINITE MESSAGES ARE CONSIDERED IN THIS WORK. THE
  FORMULA OF FINITE MESSAGE ENTROPY IS DEDUCED. IT
  IS MORE GENERAL THAN SHANNON'S FORMULA: WHEN THE
  LENGTH OF THE MESSAGE N APPROACHES INFINITY,
  SHANNON'S FORMULA IS OBTAINED. THE THEORY OF
  GENERAL AND BOOLEAN STOCHASTIC AGGREGATES IS
  CONSIDERED. THE FORMULA DEDUCED BEFORE IS USED AND
  REALIZES THE METHOD OF MARKOV-CHANDRASEKHAR FOR
  DISCRETE RANDOM MAGNITUDES. THE INTERPRETATION OF
  THE THEORY IS GIVEN IN THE FIELD OF THE ALGEBRA OF
  LOGIC. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-615 549
   TECHNICAL OPERATIONS INC BURLINGTON MASS
   MODELS OF COMMAND AND CONTROL SYSTEMS (WITH
   APPLICATIONS TO EXERCISE AND EVALUATION).   (U)
DESCRIPTIVE NOTE: FINAL REPT. FOR 30 NOV 63-31 JAN 65,

      FEB 65   144P   KUGEL,PETER OWENS,MARTIN
   F. ;
CONTRACT: AF19 628 2465
PROJ: 2801
MONITOR: ESD ,   TDR-65-183

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*COMMAND AND CONTROL SYSTEMS,
 MATHEMATICAL MODELS), (*COMMUNICATION THEORY, COMMAND
 AND CONTROL SYSTEMS , DECISION MAKING, OPERATIONS
 RESEARCH, SYSTEMS ENGINEERING, DATA PROCESSING
 SYSTEMS, AUTOMATA, DESIGN, LANGUAGE, SET THEORY,
 ANALYSIS, TAPES, EFFECTIVENESS, PROBABILITY   (U)

   FIVE MODELS OF THE ACTIVITIES OF COMMAND AND
   CONTROL SYSTEMS ARE DESCRIBED TO PROVIDE A PRECISE,
   IF NOT NECESSARILY QUANTITATIVE, FRAMEWORK WITHIN
   WHICH THE BEHAVIOR OF COMMAND AND CONTROL SYSTEMS CAN
   BE STUDIED. THE DEDUCTIVE INFERENCE MODEL
   DESCRIBES INFORMATION PROCESSING AS THE MANIPULATION
   OF STRINGS ACCORDING TO EXPLICITLY GIVEN RULES, IN
   TERMS OF SUCH A DESCRIPTION, THIS MODEL DEALS WITH
   THE PROCESSES OF PROBLEM INVESTIGATION AND PROBLEM
   SOLVING. THE INDUCTIVE INFERENCE MODEL DEALS
   WITH INFORMATION PROCESSING FOR WHICH THE SYSTEM MUST
   DERIVE THE RULES THAT ARE TO BE USED. IT RELATES
   THE ASSUMPTIONS THAT SUCH A SYSTEM MAKES AND THE
   INDUCTIVE STRATEGIES THAT IT USES TO THE ADEQUACY OF
   ITS PREDICTIONS AND GENERALIZATIONS. THE VALUE
   MODEL TREATS A COMMAND AND CONTROL SYSTEM AS A
   SYSTEM THAT APPLIES THE VALUES OF THE COMMANDER.
   IT ATTEMPTS TO RELATE NEAR RANGE FEATURES OF THE
   VALUES HELD BY PERSONNEL TO THE KINDS OF DECISIONS
   THAT THEY MAKE, THE SEMANTIC MODEL TRIES TO
   DEAL WITH THE MANNER IN WHICH COMMAND AND CONTROL
   SYSTEMS AND THEIR PERSONNEL REPRESENT THEIR
   INFORMATION ABOUT THEIR ENVIRONMENT, THE FINITE
   AUTOMATON MODEL TREATS A COMMAND AND CONTROL
   SYSTEM AND EXERCISE CONTROLLERS IN CERTAIN TYPES OF
   CONTROLLED EXERCISES AS COUPLED SEQUENTIAL MACHINES
   (FINITE AUTOMATA). IT PROVIDES A VEHICLE FOR
   STUDYING THE ABILITY OF THE EXERCISER TO CONTROL THE
   BEHAVIOR OF THE SYSTEM AND FOR STUDYING IN EXERCISE (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZFO463

AD-619 ___
  OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS LAB OF
  AVIATION PSYCHOLOGY
  THE INFLUENCE OF EXPERIENCE AND INPUT INFORMATION
  UPON POSTERIOR PROBABILITY ESTIMATION IN A SIMULATED
  THREAT-DIAGNOSIS SYSTEM.   (U)
DESCRIPTIVE NOTE: FINAL REPT. FOR 1 OCT 63-1 JUN 64,
     APR 65   TYP   SCHUM,DAVID A. ;
  GOLDSTEIN,IRWIN L. ;SOUTHARD,JACK F.;
CONTRACT: AF33 657 1763
PROJ: 7184
TASK: 718403
MONITOR: AMRL ,   TR-65-25

     UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*THREAT EVALUATION, DECISION MAKING),
  (*DECISION MAKING, SIMULATION), (*PERFORMANCE (HUMAN),
  THREAT EVALUATION), (*COMPUTERS, THREAT EVALUATION),
  MATHEMATICAL PREDICTION, HUMAN ENGINEERING,
  PSYCHOLOGY, PROBABILITY   (U)
IDENTIFIERS: BAYES' THEOREM   (U)

  THE EXPERIMENTS ARE DESCRIBED IN WHICH POSTERIOR
  PROBABILITY ESTIMATES MADE BY HUMANS ARE COMPARED
  WITH SIMILAR ESTIMATES MADE BY A COMPUTER USING A
  MODIFICATION OF BAYES THEOREM INCORPORATING HUMAN
  ESTIMATES OF P___. THE TASK WAS TO ESTIMATE, ON
  THE BASIS OF INTELLIGENCE DATA IN A SIMULATED
  THREAT-EVALUATION SITUATION, THE LIKELIHOOD OF
  VARIOUS ALTERNATIVE HYPOTHESES THAT COULD ACCOUNT FOR
  THE OBSERVED DATA. THE PURPOSE OF THE FIRST
  EXPERIMENT WAS TO STUDY THE EFFECT OF INCREASED
  EXPERIENCE UPON THE HUMANS ABILITY TO ESTIMATE
  POSTERIOR PROBABILITIES. THE PURPOSE OF THE SECOND
  EXPERIMENT WAS TO COMPARE HUMAN AND AUTOMATED
  POSTERIOR PROBABILITY ESTIMATES. IN TEN SEVERAL SERIES
  OF ___ DATA ___ IT WAS INDICATED THAT
  ___ ___ ___ ___ ___ HUMAN POSTERIOR
  PROBABILITY ESTIMATES ___ WITH INCREASING
  ___ ___ ___ ___ ___ ___ ___
  WAS ___ PARTIALLY ___ ___ THE EXPERIMENTS,
  ___ ___ ___ ___ ___ THE HUMANS PROVIDED
  ___ ___ ___ ___ ___ ESTIMATES THAN THE
  ___ ___ ___ ___ ___ WITH RESPECT TO
  THE ___ ___ ___ ___ ___, THE PRESENT
  ___ ___ ___ ___ ___ ___ ABILITY OF
  AUTOMATIC DATA ___ ___ DECISION-MAKING
  ___ ___ ___ ___ HUMAN ESTIMATES IN THE
  ___ ___ ___ ___ ___ ___ ___.   __

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO   ZFD463

AD-616 113
  CARNEGIE INST OF TECH PITTSBURGH PA GRADUATE SCHOOL OF
  INDUSTRIAL ADMINISTRATION
  A RESUME OF MATHEMATICAL RESEARCH ON INFORMATION
  SYSTEMS.   (U)
DESCRIPTIVE NOTE: MANAGEMENT SCIENCES RESEARCH REPT.,
     APR 65   19P   KRIEBEL,CHARLES H. ;
REPT. NO. MSRR-13
CONTRACT: NONR76024
PROJ: NR047 048

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REVISION OF REPORT DATED FEB 65.

DESCRIPTORS: (*MATHEMATICAL MODELS, COMMUNICATION
 THEORY), (*BIBLIOGRAPHIE , COMMUNICATION THEORY),
 (*COMMUNICATION THEORY, DATA PROCESSING SYSTEMS),
 MANAGEMENT CONTROL SYSTEMS, OPERATIONS RESEARCH,
 DOCUMENTATION, MANAGEMENT PLANNING, COMPUTERS   (U)
IDENTIFIERS: INFORMATION SYSTEMS   (U)

  THIS PAPER   ESENTS A CROSS-REFERENCED BIBLIOGRAPHY
  ON RESEARCH EMPLOYING MATHEMATICAL MODELS IN THE
  STUDY OF INFORMATION SYSTEMS. ALTHOUGH THE LISTING
  IN INTENDED PRIMARILY AS A REPRESENTATIVE
  INTRODUCTION TO THE LITERATURE, THE ENTRIES CONTAIN
  MORE THAN TEN THOUSAND SECONDARY REFERENCES.
  (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZFC463

AD-62-431   9/2   5/11
  RAND CORP SANTA MONICA CALIF
  COMMUNICATIONS, COMPUTERS AND PEOPLE,   (U)
      NOV 65   21P   BARAN, PAUL J
REPT. NO.   P-3235

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED FOR PRESENTATION AT THE
 FALL JOINT COMPUTER CONFERENCE TO BE HELD IN LAS
 VEGAS, DECEMBER 2, 1965.

DESCRIPTORS: (*DATA STORAGE SYSTEMS, COMMUNICATION
 SYSTEMS), (*COMMUNICATION SYSTEMS, DATA STORAGE
 SYSTEMS), (*SOCIOLOGY, DATA STORAGE SYSTEMS):
 DATA PROCESSING SYSTEMS, SOCIAL COMMUNICATION,
 DIGITAL COMPUTERS   (U)

  IMPACT OF THE COMPUTER TECHNOLOGY OF COMMUNICATIONS
  BUSINESS IS DISCUSSED AS IS THE INCREASE IN CREATION
  OF NEW TYPES OF COMPUTER SYSTEMS RESULTING FROM
  WIDESPREAD LOW-COST DIGITAL COMMUNICATIONS. SOCIAL
  CONSEQUENCES: LOSS OF THE INDIVIDUAL'S RIGHT TO
  PRIVACY: UNSCRUPULOUS INDIVIDUALS MAY USE THE
  INFORMATION UNLAWFULLY: ORGANIZED CRIME MAY MISUSE
  THE INFORMATION: *INFERENTIAL RELATIONAL RETRIEVAL*
  TECHNIQUES COULD DRAW CHAINS OF RELATIONSHIPS BETWEEN
  PERSONS, ORGANIZATIONS, AND EVENTS: USE OF PRIVATE
  DETECTIVES MAY INCREASE TO UNEARTH DEROGATORY
  INFORMATION ON POLITICAL CANDIDATES AND THEIR
  ASSOCIATES FOR ESTABLISHING THIN CHAINS OF INFERRED
  RELATIONSHIPS: CREATION OF REMOTE INTERROGATION
  DEVICES TO INTERACT WITH A FILE FROM A LARGE NUMBER
  OF POINTS WILL CUT COSTS OF RETRIEVAL. PROPOSED
  SPECIFIC SAFEGUARDS: PROVIDE FOR MINIMAL
  CRYPTOGRAPHIC TYPE OF PROTECTION TO COMMUNICATIONS
  LINE THAT CARRY EMBARRASSING DATA: NEVER STORE FILE
  DATA IN THE COMPLETE 'CLEAR': MAKE RANDOM EXTERNAL
  AUDITING OF FILE OPERATING PROGRAMS STANDARD
  PRACTICE: CREATE SENSIBLE, PRECISE GROUND RULES ON
  CROSS-SYSTEM INTERROGATION ACCESS FOR INTERCONNECTED
  INDIVIDUAL FILE SYSTEMS: PROVIDE MECHANISMS TO DETECT
  ABNORMAL INFORMATIONAL REQUESTS: BUILD IN PROVISIONS
  TO RECORD THE SOURCE OF REQUESTS FOR INFORMATION
  INTERROGATIONS: AND AUDIT INFORMATION REQUESTS AND
  INFORM AUTHORITIES OF SUSPECTED MISUSE OF THE SYSTEM.
                                                          (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZFD.63

AD-624 658   9/2   5/2
  GEORGIA INST OF TECH ATLANTA
  A METHOD FOR INVESTIGATING THE BEHAVIOR OF ATTRIBUTES
  WHICH BELONG TO INFORMATION STORAGE AND RETRIEVAL
  SYSTEMS.   (U)
DESCRIPTIVE NOTE: MASTER'S THESIS,
     AUG 65   98P   HECKMAN,RALPH PAUL :
CONTRACT: AF33(608)-1234

         UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFORMATION THEORY, DATA PROCESSING
 SYSTEMS), (*DATA PROCESSING SYSTEMS, INFORMATION
 THEORY), INFORMATION RETRIEVAL, DATA STORAGE
 SYSTEMS, OPERATIONS RESEARCH, STATISTICAL
 ANALYSIS   (U)
IDENTIFIERS: THESES   (U)

   THE PURPOSE OF THIS STUDY IS TO DEVELOP AND APPLY,
   BY THE WAY OF ILLUSTRATION, A METHOD FOR
   INVESTIGATING THE BEHAVIOR OF ATTRIBUTES WHICH BELONG
   TO INFORMATION STORAGE AND RETRIEVAL SYSTEMS.
   ALTHOUGH SEVERAL ATTRIBUTES ARE COMMON TO MANY
   INFORMATION SYSTEMS, THEIR VALUES DIFFER ACCORDING TO
   THE CONDITIONS WHICH ARE PRESENT IN A GIVEN SYSTEM.
   AN INVESTIGATION OF THE RELATIONSHIPS BETWEEN THE
   CONDITIONS AND THE ATTRIBUTES CAN ENLARGE THE
   OPERATIONAL UNDERSTANDING OF THE CONCEPT 'INFORMATION
   STORAGE AND RETRIEVAL SYSTEM.' AN OPERATIONAL
   UNDERSTANDING OF THIS CONCEPT IS NECESSARY IN ORDER
   TO DESIGN THESE SYSTEMS BECAUSE IT PROVIDES AN A
   PRIORI KNOWLEDE ABOUT THE PROBABLE STATE THAT A
   SYSTEM WILL ASSUME. THIS STATE IS DEFINED AS THE
   VALUES WHICH THE ATTRIBUTES WILL POSSESS UNDER
   SPECIFIED CONDITIONS, ONCE THE SYSTEM IS IN
   OPERATION.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-628 684   9/4   6/3
   THOMAS J WATSON RESEARCH CENTER YORKTOWN HEIGHTS N Y
   THE LOEVE-KARHUNEN EXPANSION AS A MEANS OF
   INFORMATION COMPRESSION FOR CLASSIFICATION OF
   CONTINUOUS SIGNALS.   (U)
DESCRIPTIVE NOTE: FINAL REPT. 15 JUL 63-14 JUL 64,
    OCT 65   34P   WATANABE,SATOSI I
CONTRACT: AF 33(657)-11347,
PROJ: AF-7233,
TASK: 723305,
MONITOR: AMRL ,   TR-65-114

        UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFORMATION THEORY,
 CLASSIFICATION), (*MATHEMATICAL LOGIC,
 INFORMATION THEORY), SIGNALS, DATA PROCESSING
 SYSTEMS, SERIES, BIOPHYSICS   (U)
IDENTIFIERS: LOEVE-KARHUNEN EXPANSION   (U)

   THE PRESENT PAPER IS CONCERNED MAINLY WITH THE
   ASPECT OF INFORMATION COMPRESSION, WHICH IS ONLY PART
   OF THE PROCESS OF RECOGNITION. THE PROBLEM OF
   ZONING (DIVISION OF THE SPACE INTO DISJOINT VOLUMES
   CORRESPONDING TO CLASSES) AND THE PROBLEM OF
   DECISION MAKING (SUCH AS THE BAYESIAN
   ALGORITHM) REQUIRE, AMONG OTHERS, CAREFUL STUDY IN
   CONNECTION WITH CLASSIFICATION AND RECOGNITION, BUT
   ARE NOT INCLUDED IN THIS PAPER.   (U)

DOC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-634 526   9/2   9/4   5/2
  OFFICE OF NAVAL RESEARCH WASHINGTON D C
  INFORMATION SYSTEMS SUMMARIES,   (U)
     JUL 65   76P   WILCOX, RICHARD H. ;
REPT. NO. ONR-ACR-113,

            UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (*INFORMATION THEORY, REVIEWS),
  (*DATA PROCESSING SYSTEMS, REVIEWS),
  DOCUMENTATION, COMPUTERS, COMPUTER LOGIC,
  AUTOMATA, LINGUISTICS, PATTERN RECOGNITION,
  MACHINES, ELECTRONICS   (U)

    CONTENTS: GENERAL INFORMATION SCIENCES:
    MACHINE INTERACTION WITH HUMANS: IMPROVED
    MACHINES.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. 2F0463

AD-655 365   9/4   6/4   5/2
  FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO
  TECHNICAL CYBERNETICS,   (U)
      APR 67   100P   KRAIZMER,L. P. :
REPT. NO. FTD-MT-65-422
MONITOR: TT   67-62360

          UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TEKHNICHESKAYA KIBERNETIKA, EDITED
 MACHINE TRANS. OF MASSOVAYA RADIO BIBLIOTEKA (USSR)
 V542 68P 1964.

DESCRIPTORS: (*INFORMATION THEORY,
 *CYBERNETICS), INFORMATION RETRIEVAL, DATA
 STORAGE SYSTEMS, DATA TRANSMISSION SYSTEMS,
 BIONICS, CONTROL SYSTEMS, AUTOMATIC,
 COMPUTERS, COMPUTER LOGIC, USSR   (-)

  THE BASIC IDEAS OF CYBERNETICS ARE POPULARLY
  EXPOUNDED AS THE SCIENCE OF THE GENERAL PRINCIPLES OF
  CONTROL. PRIMARY ATTENTION IS ALLOTTED TO
  TECHNICAL CYBERNETICS, QUESTIONS OF THE CONTROL OF
  TECHNICAL PROCESSES, AND THE CREATION OF ARTIFICIAL
  CONTROLLING SYSTEMS CONSISTING OF DEVICES FOR
  PERCEPTION, TRANSMISSION, STORAGE, AND PROCESSING OF
  INFORMATION. ELEMENTARY INFORMATION FROM
  INFORMATION THEORY IS GIVEN AS WELL AS THAT ON
  AUTOMATIC ADJUSTMENT AND ELECTRONIC COMPUTERS. THE
  POSSIBILITIES OF FULFILLMENT BY THE LATTER OF
  DIFFERENT LOGICAL FUNCTIONS ARE CONSIDERED. A
  CONSIDERABLE QUANTITY OF PRACTICAL APPLICATIONS OF
  CYBERNETIC TECHNOLOGY IS DESCRIBED BOTH IN THE FIELD
  OF AUTOMATION OF CONTROL, CALCULATION AND PLANNING,
  AS WELL AS IN THE FIELD OF SIMULATION OF
  PHYSIOLOGICAL PROCESSES IN LIVING ORGANISMS.
  BROADER MATERIALS ARE REPRESENTED REGARDING
  INFORMATION-LOGICAL MACHINES, INFORMATION CONVERTERS,
  SELF-ORGANIZED SYSTEMS, AND BIONIC METHODS OF
  IMPROVING CYBERNETIC TECHNOLOGY.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-658 613   9/4   17/1   17/9
  COOK ELECTRIC CO MORTO. GROVE ILL
  THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD
  PROCESSING. VOLUME I,   (U)
     JUN 67   632P   GERLACH,ALBERT A. ;
CONTRACT: NOBSR-77614
PROJ: SS-06500
TASK: 8183

          UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN COPYRIGHTED JOURNAL.
SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-658 614;
 VOLUME 3, AD-658 615. HARD COPY AVAILABLE FROM COOK
 ELECTRIC CO., MORTON GROVE, ILL.

DESCRIPTORS: (*INFORMATION THEORY, STATISTICAL
 ANALYSIS), (*SONAR SIGNALS, SPECTRUM
 SIGNATURES), (*RADAR SIGNALS, SPECTRUM
 SIGNATURES), (*SPECTRUM SIGNATURES,
 DETECTION), SIGNAL-TO-NOISE RATIO, SAMPLING,
 CODING, OPTIMIZATION, TARGETS, LINEAR SYSTEMS,
 NONLINEAR SYSTEMS, CORRELATION TECHNIQUES,
 ADAPTIVE SYSTEMS   (U)
IDENTIFIERS: WAVE-PERIOD PROCESSING   (U)

  THE BOOK COVERS IN A COHERENT AND UNIFIED MANNER
  THE THEORY AND APPLICATIONS OF INFORMATION PROCESSING
  KNOWN TO BE OF IMPORTANCE IN SIGNAL SIGNATURE
  RECOGNITION: PARTICULARLY, AS APPLIED TO SONAR AND
  RADAR SYSTEMS. CONTENTS OF VOLUME I INCLUDE
  THE FOLLOWING: INTRODUCTION AND SUMMARY;
  ANALYSIS OF LINEAR TRANSMISSION SYSTEMS; LINEAR
  THEORY OF SIGNATURE RECOGNITION; STATISTICAL
  SAMPLING THEORY; THE STORED REPLICA PHASE-COHERENCE
  CROSS-CORRELATOR; THE ADAPTIVE PHASE-COHERENCE
  CROSS-CORRELATOR; WAVE-PERIOD MEASURE AND ITS
  STATISTICAL PROPERTIES; CODING AND PROCESSING OF
  WAVE-PERIOD MEASURE.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-658 614   9/4   17/1   17/9
  COOK ELECTRIC CO MORTON GROVE ILL
  THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD
  PROCESSING. VOLUME II,   (U)
      JUN 67   608P   GERLACH,ALBERT A. ;
CONTRACT: NOBSR-77614
PROJ: SS-04500
TASK: 8183

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN COPYRIGHTED
  JOURNAL.
SUPPLEMENTARY NOTE: HARD COPY AVAILABLE FROM COOK
 ELECTRIC CO., MORTON GROVE, ILL. SEE ALSO
 VOLUME 1, AD-658 613; VOLUME 3, AD-658 615.

DESCRIPTORS: (*INFORMATION THEORY, STATISTICAL
 ANALYSIS), (*SONAR SIGNALS, SPECTRUM
 SIGNATURES), (*RADAR SIGNALS, SPECTRUM
 SIGNATURES), (*SPECTRUM SIGNATURES,
 DETECTION), DECISION MAKING, SIGNAL-TO-NOISE
 RATIO, CODING, MATHEMATICAL MODELS, MAGNETIC
 CORE STORAGE, TARGETS, ANALOG SYSTEMS, ACCURACY,
 DISPLAY SYSTEMS, CONTROL SYSTEMS   (U)
 IDENTIFIERS: WAVE-PERIOD PROCESSING   (U)

  THE BOOK COVERS IN A COHERENT AND UNIFIED MANNER
  THE THEORY AND APPLICATIONS OF INFORMATION PROCESSING
  KNOWN TO BE OF IMPORTANCE IN SIGNAL SIGNATURE
  RECOGNITION; PARTICULARLY, AS APPLIED TO SONAR AND
  RADAR SYSTEMS. CONTENTS OF VOLUME II INCLUDE
  THE FOLLOWING: ANALYSIS AND EXPERIMENTS IN
  STATISTICAL WAVE-PERIOD PROCESSING; A MODEL
  DETECTION PROCESSOR AND ITS OPERATIONAL
  CHARACTERISTICS; FALSE TARGET RATE AND PER CENT OF
  CLUTTER IN DETECTION PROCESSORS; DESIGN PROCEDURES
  FOR WAVE-PERIOD DETECTION PROCESSORS; AUTOMATIC
  TARGET LEVEL COMPENSATION FOR WAVE-PERIOD PROCESSORS;
  EFFECTS OF SIGNATURE SMEARING IN PRACTICAL
  DETECTION PROCESSORS; FINE-GRAIN STATISTICAL WAVE-
  PERIOD PROCESSING; INFORMATION STORAGE AND DISPLAY
  CONCEPTS FOR AN ACTIVE DETECTION SYSTEM.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-658 615   9/4   17/1   17/9
  COOK ELECTRIC CO MORTON GROVE ILL
  THEORY AND APPLICATIONS OF STATISTICAL WAVE-PERIOD
  PROCESSING. VOLUME III,   (U)
     JUN 67   56RP   GERLACH,ALBERT A. :
CONTRACT: NOBSR-77614
PROJ: SS-06500
TASK: 8183

          UNCLASSIFIED REPORT
 AVAILABILITY: PUBLISHED IN COPYRIGHTED JOURNAL.
SUPPLEMENTARY NOTE: SEE ALSO VOLUME 1, AD-658 6
 VOLUME 2, AD-658 614. HARD COPY AVAILABLE FROM COOK
 ELECTRIC CO., MORTON GROVE, ILL.

DESCRIPTORS: (*INFORMATION THEORY, STATISTICAL
 ANALYSIS), (*SONAR SIGNALS, SPECTRUM
 SIGNATURES), (*RADAR SIGNALS, SPECTRUM
 SIGNATURES), (*SPECTRUM SIGNATURES,
 DETECTION), GRAPHICS, MATHEMATICAL MODELS,
 SIGNAL-TO-NOISE R   I   DECISION MAKING, TARGETS,
 PROBABILITY, TABLES   (U)
IDENTIFIERS: WAVE-PERIOD PROCESSING   U)

  THE BOOK COVERS IN A COHERENT AND UNIFIED MANNER
  THE THEORY AND APPLICATIONS OF INFORMATION PROCESSING
  KNOWN TO BE OF IMPORTANCE IN SIGNAL SIGNATURE
  RECOGNITION: PARTICULARLY, AS APPLIED TO SONAR AND
  RADAR SYSTEMS. CONTENTS OF VOLUME III INCLUDE
  THE FOLLOWING: GRAPHICAL PRESENTATIONS OF MODEL
  WAVE-PERIOD PROCESSOR PERFORMANCE CHARACTERISTICS:
  TABLES OF MODEL WAVE-PERIOD PROCESSOR PERFORMANCE
  AND SUPPORTING DATA.   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZFD463

AD-658 775   9/4   9/2   17/2
  MASSACHUSETTS INST OF TECH LEXINGTON LINCOLN LAB
  ANALOG SOURCE DIGITIZATION: A COMPARISON OF THEORY
  AND PRACTICE.   (U)
DESCRIPTIVE NOTE: REVISED ED.,
     JUL 66   5P   GOBLICK,THOMAS J. , JR.:
  HOLSINGER,JEROME L. :
REPT. NO. JA-2646
CONTRACT: AF 19(628)-5167
MONITOR: ESD   TR-67-470

        UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN IEEE TRANSACTIONS ON
  INFORMATION THEORY VIT13 N2 P323-6 APR 1967.
SUPPLEMENTARY NOTE: PREPARED IN COOPERATION WITH DEFENSE
  RESEARCH CORP., SANTA BARBARA, CALIF. REVISION
  OF MANUSCRIPT SUBMITTED 10 MAR 66.

DESCRIPTORS: (*INFORMATION THEORY, *ANALOG-TO-
  DIGITAL CONVERTERS), DATA TRANSMISSION SYSTEMS,
  DATA PROCESSING SYSTEMS, STATISTICAL PROCESSES,
  CODING   (U)

  THE OUTPUT OF AN ANALOG SOURCE IS OFTEN CONVERTED
  TO DIGITAL FORM FOR TRANSMISSION OVER A NOISY
  CHANNEL. OVERALL COMMUNICATION SYSTEM EFFICIENCY
  DEMANDS THAT THIS DIGITIZATION BE DONE IN A MANNER
  THAT MINIMIZES THE DATA RATE REQUIRED TO ACHIEVE A
  CERTAIN LEVEL OF FIDELITY IN THE WAVEFORM
  RECONSTRUCTED AT THE RECEIVER. THE INFORMATION
  RATE OF THE SOURCE WITH RESPECT TO A FIDELITY
  CRITERION PROVIDES THE MINIMUM OF THIS DATA RATE
  CONSISTENT WITH THE FIDELITY CRITERION FOR ANY
  DIGITIZATION SCHEME. AN ANALOG SOURCE IS MODELLED
  AS A STATIONARY, GAUSSIAN PROCESS WITH MEAN SQUARED
  ERROR AS THE FIDELITY CRITERION. THE GAPS IN
  PERFORMANCE BETWEEN SOME PRACTICAL DIGITIZATION
  SYSTEMS EMPLOYING FILTERS, SAMPLERS, AND QUANTIZERS
  AND THE THEORETICAL LIMITATIONS ARE THEN CALCULATED.
  FOR THIS MODEL, ONE IS THEN IN A POSITION TO JUDGE
  THE WORTH OF THESE SIMPLE DIGITIZATION SCHEMES AND TO
  ILLUSTRATE EXPLICITLY THE MAXIMUM POTENTIAL PAYOFF OF
  FURTHER RESEARCH IN EFFICIENT DIGITIZATION
  TECHNIQUES. (AUTHOR)   (U)

DDC REPORT BIBLIOGRAPHY   SEARCH CONTROL NO. ZF0463

AD-663 958   9/4   5/6
  PENNSYLVANIA UNI. PHILADELPHIA MOORE SCHOOL OF
  ELECTRICAL ENGINEERING
  COMPUTER AND INFORMATION SCIENCES AND THE COMMUNITY
  OF DISCIPLINES,   (U)
       NOV   66   23P   GORN,S* L :
CONTRACT: DA-31-124-ARD(D)-98, AF 30(602)-3030
PROJ: DA-200145019141
MONITOR; ARDD   416013

       UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN BEHAVIORAL SCIENCE V12
  N6 P413-57 NOV. 1967.

DESCRIPTORS: (*INFORMATION THEORY, REVIEWS),
  CYBERNETICS, INFORMATION RETRIEVAL, SOCIAL
  SCIENCES, COMPUTERS, EDUCATION, MATHEMATICAL
  MODELS, PROGRAMMING LANGUAGES, ARTIFICIAL
  INTELLIGENCE, SCIENTIFIC RESEARCH   (U)
IDENTIFIERS: INFORMATION SCIENCES   (U)

  THE AUTHOR DISCUSSES THE COMPUTER AND INFORMATION
  SCIENCES, WHICH HE CONSIDERS A NEW DISCIPLINE. HE
  CONSIDERS HOW THIS NEW SCIENCE HAS BEEN AFFECTING
  OTHER SCIENCES, ARTS, AND PROFESSIONS. THE
  APPROACH IS A PHILOSOPHIC ATTITUDE WHICH THE AUTHOR
  CALLS CYBERNETIC PRAGMATISM, WITHIN WHICH A MODEL IS
  GIVEN OF THE GROWTH AND INTERRELATIONSHIP OF
  INFORMATION SYSTEMS AND THE ORGANIZATIONS WHICH USE
  THEM. THE DISCUSSION CONCLUDES WITH A SECTION ON
  INTERDISCIPLINARY POLITICS AND A REEVALUATION OF
  LIBERAL ARTS EDUCATION.   (U)

AD-664 649   YDM
  NAVAL RESEARCH LAB WASHINGTON D C
  POWER SPECTRUM ESTIMATES OF SAMPLED PSEUDO-RANDOM
  SEQUENCES.   (U)
DESCRIPTIVE NOTE: INTERIM REPT.,
       DEC 67   92P   MCCOY,CALDWELL , JR:
REPT. NO. NRL-6673
PROJ: RF-101-03-44-4054

       UNCLASSIFIED REPORT

DESCRIPTORS: *INFORMATION THEORY, *POWER
 SPECTRA , CORRELATION TECHNIQUES, SAMPLING,
 STATISTICAL ANALYSIS, RANDOM VARIABLES, PERIODIC
 VARIATIONS, INTEGRAL TRANSFORMS, DIGITAL SYSTEMS,
 SHIFT REGISTERS, BANDWIDTH, THESES   (U)
IDENTIFIERS: PSEUDO-RANDOM SEQUENCES,
 AUTOCORRELATION FUNCTION, ELECTROMAGNETIC NOISE   (U)

     THE REPORT CONCERNS POWER SPECTRUM ESTIMATES OF
 SAMPLED PSEUDO-RANDOM SIGNALS, AND SHOWS THAT FOR
 THESE SIGNALS THE SPECTRAL POWER IS MORE RELEVANT
 THAN THE AUTOCORRELATION FUNCTION. THE POWER
 SPECTRUM ESTIMATES CONSIDERED HERE ASSUME
 STATIONARITY AND ZERO MEANS. THE SIGNAL UNDER
 INVESTIGATION IS A PSEUDO-RANDOM TYPE BINARY
 SEQUENCE. PSEUDO-RANDOM SEQUENCES (PSEUDO-
 RANDOM SIGNALS) ARE RANDOM BECAUSE (A) THEY CAN
 BE GENERATED WITH RELATIVE EASE FROM LINEAR SHIFT
 REGISTERS, (B) THESE DETERMINISTIC WAVEFORMS HAVE
 UNIFORM POWER THROUGHOUT THEIR BANDWIDTHS, AND
 (C) THEIR AUTOCORRELATIONS ARE APPROXIMATELY ZERO
 EXCEPT A NARROW PEAK AT ZERO LAG. THIS STUDY IS
 CONCERNED WITH SOME APPLIED METHODS AND RESULTS OF
 THESE APPLICATIONS TO BANDLIMITED SIGNALS THAT HAVE
 BEEN CORRUPTED BY ADDITIVE NOISE, MULTIPLE PATH, AND
 DOPPLER EFFECTS AND THAT HAVE BEEN PROCESSED
 DIGITALLY TO OBTAIN CORRELATIONS AND POWER SPECTRA.
 THE OBJECT WAS TO OBSERVE THE EFFECTS ON THE POWER
 SPECTRUM ESTIMATES DUE TO THESE PERTURBATIONS. THE
 ANALYSIS WAS PERFORMED EXCLUSIVELY ON FILTERED
 MAXIMAL LENGTH PSEUDO-RANDOM SEQUENCES. THESE
 FILTERED SEQUENCES WERE TAILORED TO A BANDWIDTH AND
 SAMPLE RATE TO YIELD OPTIMAL RESULTS FOR A GIVEN
 COMPUTER MEMORY CAPABILITY. (AUTHOR)   (U)

AD-667 097   22/2   20/4   20/13   1/1
  MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS
  AND ASTRONAUTICS
  A CHARACTERISTICS APPROACH TO RADIATION
  GASDYNAMICS,   (U)
      F.   68   17P   FINKLEMAN,DAVID I
CONTRACT: AF 49(638)-1621
PROJ: AF-9781
TASK: 9/6102
MONITOR: AFOSR   68-0616

      UNCLASSIFIED REPORT
  AVAILABILITY: PUBLISHED IN PROCEEDINGS OF AIAA
  AEROSPACE SCIENCES MEETING (6TH), 22-4 JAN 68,
  NEW YORK, PAPER NO. 68-163.

DESCRIPTORS: (*REENTRY VEHICLES, HYPERSONIC
 CHARACTERISTICS), THERMAL RADIATION, SLENDER
 BODIES, ONE-DIMENSIONAL FLOW, ABSORPTION, SHOCK
 WAVES, ENTROPY, FLOW FIELDS, EMISSIVITY,
 DESIGN, PISTONS   (U)
IDENTIFIERS: METHOD OF CHARACTERISTICS, GAS
 DYNAMICS, BLOWING, SUCTION   (U)

  SINCE THE EQUATIONS WHICH GOVERN UNSTEADY RADIATION
  GAS-DYNAMICS ARE HYPERBOLIC, GENERAL SITUATIONS ARE
  ATTACKED WITH A NUMERICAL METHOD OF CHARACTERISTICS.
  UPSTREAM ABSORPTION OF SHOCK LAYER RADIATION IS
  INCLUDED, AND IT IS PROVED THAT ONLY MARK RADIATION
  BOUNDARY CONDITIONS ARE APPROPRIATE TO A P SUB 1
  DIFFERENTIAL APPROXIMATION OF ONE-DIMENSIONAL
  RADIATIVE FIELDS. FLOW FIELDS GENERATED BY PISTONS
  INSERTED INTO IDEAL GASES WITH ARBITRARY ABSORPTION
  PROPERTIES ARE INVESTIGATED WITH THE DIFFERENTIAL
  APPROXIMATION AND THE FULL TRANSFER EQUATION.
  RESULTS SHOW THAT THE DIFFERENTIAL APPROXIMATION
  PREDICTS SURFACE PRESSURES AND HEAT TRANSFER RATES
  ACCURATELY AND THAT LINEAR THEORIES MAY BE IN ERROR.
  NONMONOTONIC SURFACE PRESSURE HISTORIES ARE NOTED,
  AND IT IS OBSERVED THAT SURFACE EMISSIVITIES AND
  TEMPERATURES EXERT 'BLOWING' OR 'SUCTION' UPON
  ENTROPY LAYERS. UPSTREAM ABSORPTION IS A DOMINANT
  MECHANISM IN FLOW FIELD EVOLUTION, AND THE EFFECTS OF
  RADIATION UPON PRESSURE AND VELOCITY MAY BE
  COMPARABLE TO THOSE UPON TEMPERATURE.
  (AUTHOR)   (U)

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AD-6 9 283   20/14   17/2.1   9/4
  INSTITUTE FOR TELECOMMUNICATION SCIENCES BOULDER COLO
  CHANNEL SIMULATION-DIGITAL VS. ANALOG.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
     MAR 68   54P   QUINCY,E. A. ;
REPT. NO. ITS-60
MONITOR: ERL   70

        UNCLASSIFIED REPORT
   AVAILABILITY: HARD COPY AVAILABLE FROM
   SUPERINTENDENT OF DOCUMENTS, GPO, WASHINGTON, D.
   C. 20402 $0.25.

DESCRIPTORS: (*INFORMATION THEORY, MULTIPATH
   TRANSMISSION), (*MULTIPATH TRANSMISSION,
   SIMULATION), INTEGRAL TRANSFORMS, TRANSFER
   FUNCTIONS, ANALOG-DIGITAL COMPUTERS, DIGITAL
   COMPUTERS, REAL TIME, COSTS, HIGH FREQUENCY   (U)
IDENTIFIERS: TROPOSPHERIC SCATTER COMMUNICATION,
   COMPUTER SIMULATION, COST ANALYSIS   (U)

   A COMPARISON IS MADE OF DIGITAL COMPUTERS AND
   SPECIALLY CONSTRUCTED ANALOG (HYBRID) DEVICES FOR
   SIMULATION OF RANDOM, TIME-VARIANT, TIME- AND
   FREQUENCY-DISPERSIVE CHANNELS. THE COMPARISON IS
   MADE PRIMARILY ON AN ECONOMIC BASIS; HOWEVER,
   EMPHASIS IS ALSO GIVEN TO THE COMPUTER SPEED REQUIRED
   FOR REAL-TIME DIGITAL SIMULATION. A PHYSICALLY
   ORIENTED CHANNEL MODEL IS PRESENTED. A COST
   ANALYSIS IS PRESENTED. TYPICAL TROPOSCATTER (1
   MHZ BW AND 1 MICROSEC. DISPERSION) AND HF (3
   KHZ BW AND 1.5 MS DISPERSION) CHANNELS ARE
   CONSIDERED AS SPECIFIC EXAMPLES. PRESENT-DAY
   GENERAL PURPOSE DIGITAL COMPUTERS AND THE FASTEST
   SIGNAL PROCESSORS AVAILABLE ARE SHOWN TO REQUIRE
   APPROXIMATELY THE SAME AMOUNT OF COMPUTING TIME FOR
   SIMULATION. NEITHER IS CAPABLE OF REAL-TIME
   SIMULATION OF EITHER AN HF OR TROPOSCATTER CHANNEL.
   (AUTHOR)   (U)

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AD-806 373   17/2   9/2   9/5
  NORTHWESTERN UNIV EVANSTON ILL INFORMATION-PROCESSING AND
  CONTROL SYSTEMS LAB
  ANALYSIS AND DESIGN OF COMMUNICATION NETWORKS WITH
  MEMORY.   (U)
DESCRIPTIVE NOTE: TECHNICAL REPT.,
    JAN 67   29P   HAKIMI,S. LOUIS ;
REPT. NO. TR-67-103
CONTRACT: N00014-66-C-0020, AF-AFOSR-98-65
PROJ: NR-373-502
MONITOR: AFOSR   67-0393

        UNCLASSIFIED REPORT

DESCRIPTORS: (*COMMUNICATION SYSTEMS,
 NETWORKS), OPTIMIZATION, EQUATIONS, LINEAR
 PROGRAMMING, GRAPHICS, TRANSMISSION LINES,
 ROADS, COMPUTER STORAGE DEVICES, DATA STORAGE
 SYSTEMS, TRAFFIC   (U)

   A MATHEMATICAL FORMULATION OF THE COMMUNICATION
   NETWORKS WITH MEMORY IS PRESENTED ASSUMING THAT THE
   SOURCES OF TRAFFIC ARE DETERMINISTIC BUT NOT
   NECESSARILY TIME INVARIANT. THE FORMULATION LEADS
   TO A LINEAR PROGRAMMING PROBLEM. SOME
   GENERALIZATIONS AND JUSTIFICATIONS OF THE CHOICE OF
   THE MODEL ARE DISCUSSED. THE SAME BASIC
   FORMULATION CAN BE USED AS A TOOL FOR ANALYSIS AS
   WELL AS LEAST-COST DESIGN OR IMPROVEMENT OF AN
   EXISTING NETWORK. DESIGN OF TH MEMORY SYSTEMS AND
   ITS RELATION WITH MESSAGES WITH PRIORITIES IS
   CONSIDERED. SIMILAR CONCEPTS ARE USED TO ARRIVE AT
   AN APPROXIMATE LINEAR PROGRAMMING FORMULATION OF
   STREET TRAFFICE. (AUTHOR)   (U)

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ERL-73

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13 ABSTRACT

This unclassified and unlimited bibliography contains 186 references concerning Computer-Aided Logical Processes. The references include all research dealing specifically with the processes of information handling and the application of fundamental mathematical theory to the construction or better understanding of information systems.

The citations are grouped under six major headings: Computer Logic; Biological Information Handling; Human Factor Information Handling; Programmed Instruction; Network and Switching Systems Theory; and Information, Communication, and Systems Theory.

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